Assignment - 1

~~Assignment 1~~

Sub - Maths.

Class VIII th. by. C.B. Kumar.

Rational Number.

Exercise. 1 A.

Q.No. 1 - Express $\frac{-42}{98}$ as a rational Number with denominator 7.

Q.No. 2. Express each of the following rational Number in standard form.

(i) $\frac{-12}{30}$ (ii) $\frac{-14}{49}$ (iii) $\frac{24}{-64}$ (iv) $\frac{-36}{-63}$

Q.No. 3. Arrange the following rational Number in assending order

(i) $\frac{4}{-9}, \frac{-5}{12}, \frac{7}{-18}, \frac{-2}{3}$ (ii) $\frac{-3}{4}, \frac{5}{-12}, \frac{-7}{16}, \frac{9}{-24}$

Q.No. 4 - Arrange the following rational Number in decending order.

(i) $\frac{-5}{6}, \frac{-7}{12}, \frac{-13}{18}, \frac{23}{-24}$

(ii) $\frac{-10}{11}, \frac{-19}{22}, \frac{-23}{33}, \frac{-39}{44}$

Assignment - 2

Sub - Maths

class - VIII th.

by - C.B. Kumar.

Rational Number.

Exercise.. 1.3

Q.No.1 - Represent each of the following numbers on the number line.

(i) $-\frac{1}{3}$ (ii) $-\frac{3}{4}$ (iii) $-1\frac{2}{3}$ (iv) $-3\frac{1}{7}$

Q.No 2 Represent $\frac{2}{3}$ and $-\frac{2}{3}$ on the number line.

Q.No.3. Represent each of the following numbers on the number line

(i) $3\frac{1}{2}$, (ii) $5\frac{5}{7}$, (iii) $4\frac{2}{3}$ (iv) 8

Q.No.4 Represent $\frac{13}{5}$ and $-\frac{13}{5}$ on the number line.

Assignment - 3
Sub - Maths
class VIII th.
by - C. B. Kumar
Rational Number
Exercise - 1 a

Q. No 1 - Subtract $\frac{3}{4}$ from $\frac{2}{3}$

Q. No. 2 - What number should be added to $-\frac{7}{8}$ to get $\frac{4}{9}$?

Q. No. 3 Evaluate - $\frac{3}{5} + \frac{7}{3} + \frac{-11}{2} + \frac{-2}{3}$

Q. No. 4 Simplify - $(\frac{4}{7} + \frac{-8}{9} + \frac{-2}{21} + \frac{1}{3}$

Q. No 5. What should be subtracted from $\frac{-2}{3}$ to get $\frac{-1}{6}$?

Q. No. 6 The sum of two rational number is $-\frac{1}{2}$. If one of them number is $\frac{5}{6}$ find the other.

Assignment - 4

Sub - Maths

class - VIII th.

by - A. B. Kumar

Rational Number

Exercise - 1 D

Q.NO.1 - Find the each of the following Products.

(i) $\frac{3}{5} \times \frac{-7}{8}$ (ii) $\frac{-9}{2} \times \frac{5}{4}$ (iii) $\frac{-6}{11} \times \frac{-5}{3}$

Q.NO.2 - Find the multiplicative Inverse of

(i) $\frac{-3}{-5}$ (ii) -1 (iii) $\frac{0}{2}$ (iv) $\frac{-1}{8}$

Q.NO.3. Find the value of

(i) $\left(\frac{5}{8}\right)^{-1}$ (ii) $\left(\frac{-4}{9}\right)^{-1}$

Q.NO.4. Verify the following.

(i) $\frac{3}{7} \times \left(\frac{5}{6} + \frac{12}{13}\right) = \left(\frac{3}{7} \times \frac{5}{6}\right) + \left(\frac{3}{7} \times \frac{12}{13}\right)$

(ii) $\frac{-16}{7} \times \left(\frac{-8}{9} + \frac{-7}{6}\right) = \left(\frac{-16}{7} \times \frac{-8}{9}\right) + \left(\frac{-16}{7} \times \frac{-7}{6}\right)$

Assignment - Assignment 1 Sub - Maths
class VIII A. by C.B. Kumar
Rational Number
Exercise 1E

Q. No. 1 Simplify (i) $\frac{4}{9} \div \frac{-2}{12}$ (ii) $\frac{-16}{35} \div \frac{-15}{14}$

Q. No. 2 - Verify the given statement is true or False — $\left\{(-16) + \frac{6}{5}\right\} \div \frac{-9}{10} = (-16) \div \left\{\frac{6}{5} \div \frac{-9}{10}\right\}$

Q. No. 3 — The Product of two rational Number is $\frac{-16}{9}$ If one of the number is $\frac{-4}{3}$ find the other

Q. No. 4 - Divide the sum of $\frac{65}{12}$ and $\frac{8}{3}$ by their difference.

Q. No. 5 Fill in the blanks.

(i) $\frac{9}{8} \div (\ldots\ldots) = \frac{-3}{2}$ (ii) $(\ldots\ldots) \div \left(\frac{-7}{5}\right) = \frac{10}{19}$

(iii) $(\ldots\ldots) \div (-3) = \frac{-4}{15}$ (iv) $(-12) \div (\ldots\ldots) = \frac{-6}{5}$

Assignment - 6

Sub - Maths

class - VIII th.

by - C.B Kumar

Rational Number

Exercise - 1 F

Q.NO 1 - Find a rational number between 2 and 3

Q.NO 2 Find two rational number between -3 and -2.

Q.NO 3 Find three rational number between $\frac{2}{3}$ and $\frac{3}{4}$

Q.NO 4 - Find 10 rational number between $-\frac{3}{4}$ and $\frac{5}{6}$

Q.NO 5 - Find 12 rational number between -1 and 2

Assignment-7. Sub: Maths

class: VIIIth. by: C.B Kumar

Rational Number

Exercise - 1G.

B.No.1. Find the cost of $3\frac{2}{5}$ m cloth at ₹ $63\frac{3}{4}$ per metre.

B.No.2. Find the area of Rectangular park, which is $36\frac{3}{5}$ m long and $16\frac{2}{3}$ m broad.

B.No.3. After reading $\frac{7}{9}$ of a book, 40 pages are left. How many pages are there in the book.

B.No.4. If $\frac{3}{5}$ of a number exceeds it's $\frac{2}{7}$ by 44 find the number.

B.No.5. At a cricket test match $\frac{2}{7}$ of the spectators were in a covered place. While 15000 were in open. Find the total. Number of spectators.

~~Assignment~~ → Assignment 8 Sub. Maths

Class VIII th By. C. B. Kumar

Ch. 2 Exponents

Exercice 2 A

Q. No 1 Evalute

(i) 4^{-3} (ii) $\left(\frac{5}{3}\right)^{2} \times \left(\frac{5}{3}\right)^{2}$ (iii) $\left(\frac{-2}{3}\right)^{-3} \times \left(\frac{-2}{3}\right)^{-2}$

(iv) $\left\{\left(\frac{-2}{3}\right)^{2}\right\}^{-2}$

Q. No 2 Evalute $\left[(5^{-1} \times 3^{-1})^{-1} \div 6^{-1}\right]$

Q. No 3 Find the value of x for which

$$\left(\frac{4}{9}\right)^{4} \times \left(\frac{4}{9}\right)^{-7} = \left(\frac{4}{9}\right)^{2x-1}$$

Q. No 4 By what number should $(-6)^{-1}$ be multiplied so that the product becomes 9^{-1}

Q. 5 If $5^{2x+1} \div 25 = 125$ find the value of x

German Quality and Innovation

~~Assignment-2~~ Assignment 2 Sub Maths
class VIII th. by C.B. Kumar.

Exponents

Exercise 2.B.

Q.NO.1 – Express each of the number in standard form.

(i) 6872. (ii) 140000 (iii) 153600000000

Q.NO.2 (i) The height of mount everest is 8848 m write it in standard form.

(ii) The speed of light is 300000000 m/sec Express it in standard form.

(iii) The distance from the earth to the sun is 149600000000km. write in standard form.

Q.NO.4 The size of a red blood cell is 0.000007m and that of a plant cell is 0.0000127 m. Show that a red blood cell is half of plant cell in size.

Assignment-10 Sub - maths.
class - VIII th by c. B. Kumar.
Ch - 5.
Playing with number.
Exercise - 5 A.

Q.No1 - The units digit of two digit number is 3 and seven times the sum of the number is itself. Find the numbers.

Q.2 - A Two digit numbers is 3 more than 4 times the sum of its digits. If 18 is added to the numbers, its digits are reversed Find the number.

Q.3 In a 2 digit number the units digit is four times the tens digit and the sum of the digits is 10 Find the numbers.

Q.4 - The difference between a 2 digit number and the numbers obtained by interchanging its digits is 63. What is the difference between the digits of the number.

German Quality and Innovation

Assignment - II
class - VIII th
playing with number.
Exercise - 2B

sub - Maths
by. C.B. Kumar.

Q.1 - Test the divisibility of each of the following number by 3

(I) 83 (II) 378 (III) 20345 (IV) 67035
(V) 903164 (VI) 100002

Q.2 - Test the divisibility of each of the number by 11

(I) 444444 (II) 1057982 (III) 900163
(IV) 7531622

Q.3. Find the value of z for which the number 471z8 is divisible by 9. Also Find the number

Q.4. Give five examples of numbers each one of which is divisible by 4 and not divisible by 8.

Assignment — 12. Sub- Maths

Class, VIII th. by C.B.Kumar

Playing with numbers

Ex - 5.C

Q.1. Replace A, B, and C by Suitable number

(I)
$$\begin{array}{r} 5A \\ +\ B7 \\ \hline CB3 \end{array}$$

(II)
$$\begin{array}{r} A \\ A \\ +\ A \\ \hline BA \end{array}$$

(III)
$$\begin{array}{r} 6A \\ -\ AB \\ \hline 37 \end{array}$$

(IV)
$$\begin{array}{r} AB \\ \times\ BA \\ \hline (B+1)CB \end{array}$$

(V) $6\overline{)3AB(9C}$

-54

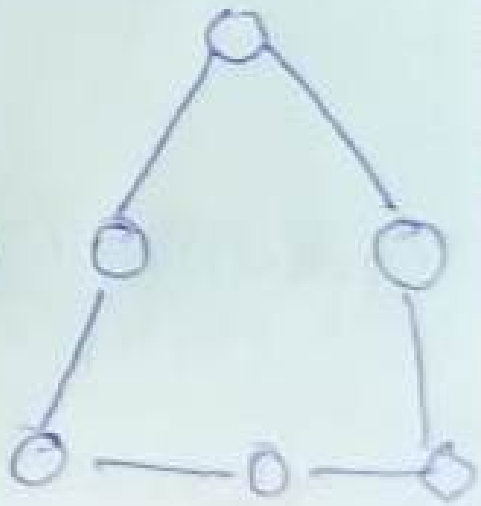
$3B$

-36

(VI)
$$\begin{array}{r} CB\bar{5} \\ -28A \\ \hline 259 \end{array}$$

Q.2. Find three whole numbers which Product and Sum are equal.

Q.3. Fill in the numbers from 1 to 6 without repetition. So that each side of the triangle adds up to 12



असाइनमेंट – 1 विषयः संस्कृत व्याकरण कक्षा – VIII

पाठ – 2 (वर्ण – विचार) पेज (3 से 7)

१. वर्ण की परिभाषा उदाहरण के साथ लिखें।

२. वर्णों को मुख्यतः कितने भागों में बाँटा गया है ? उनकी परिभाषा उदाहरण के साथ लिखें।

३. स्पर्श, अन्तःस्थ तथा ऊष्म व्यंजन के दो–दो उदाहरण लिखें।

४. संस्कृत में व्यंजनों तथा स्वरों की संख्या बतलाएँ।

५. निम्नलिखित का उच्चारण स्थान बताएँ।
अ, क, प, य, व, ए।

६. क्ष, त्र, ज्ञ की गणना क्यों नहीं की गई है ? लिखें।

असाइनमेंट – 2 विषयः संस्कृत व्याकरण कक्षा – VIII

पाठ – 3 (संधि – परिभाषा एवं भेद)पेज (8 से 20)
(अभ्यास)

१. संधि किसे कहते हैं ? संधि के कितने भेद हैं ? सोदाहरण लिखें।

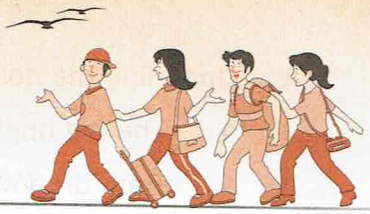
२. स्वर संधि के पाँचों भेद परिभाषा तथा उदाहरण सहित लिखें।

३. संधि करें।
हिम + अद्रिः = ---------
हरि + इच्छा = ---------
तथा + एव = ---------
नौ + इकः = ---------
भो + अनम् = ---------

४. विच्छेद करें।
पवनम्, सीमन्तः, नायकः, नयनम्, भवनम्, गायकः,
भावुकः, अध्यापकः, अध्ययनम्, अत्याचारः।

असाइनमेंट – 3 विषयः संस्कृत व्याकरण कक्षा – VIII

शब्द रूपावली – देव, मुनि, लता, मति, नदी।
धातु रूपावली – भू, पठ्, अस्, गम्, स्था। (पाँचों लकारों में)
गणना – 1 से 100
अनुच्छेद – क) अस्माकं देशः
ख) बिहार राज्यम्



1 Phrases

Warm-up

Match the parts in the four columns to make meaningful sentences.

The dull grey curtains	chewing the rattle	was battering	by the wind.
The powerful rain	of my bedroom	was bought	on the rooftop.
The curly haired baby	on the shelf	are being blown	at everyone.
A carved silver kettle	during the night	was smiling	by his mother.

You just combined phrases in the four columns to make sentences.

A **phrase** may be two or more words that together make up a part of a sentence. It makes no sense outside the sentence as it does not have a finite verb. A phrase may also function as a noun, an adjective, an adverb or as a preposition with an object noun.

Let us read on to understand about the kinds of phrases that make up a sentence.

The **finite verb** is usually the main verb of a sentence. It is the verb that changes form to show tense and changes with the number of the subject.

For example:

- Mona **enjoys** driving.
- We **enjoy** driving in the hills.
- The family **enjoyed** driving uphill.

Noun Phrase

A **noun phrase** is made up of a head noun or pronoun and other modifiers before or after it. It acts as the subject or the object of the verb.

For example:

- **My new pair of jeans** is very comfortable.

  (noun phrase *my new pair of jeans*, with the head noun *jeans*, functioning as the subject noun in the sentence)

- We have adopted **a small black puppy**.

  (noun phrase *a small black puppy*, with the head noun *puppy*, functioning as the object noun in the sentence)

A. **Underline the *noun phrases* in these sentences.**

1. The big bright full moon adorned the sky.
2. Beth dreamt she was all alone on a lonely planet.
3. The big black dog is very friendly.
4. My piano lessons are progressing well.
5. The paperback edition of this book is not available anywhere.
6. Chemical pesticides and fertilisers are poisoning waterbodies too.

Adjective Phrase

An **adjective phrase** is a group of words that functions as an adjective and modifies a noun, a noun phrase or a pronoun in a sentence. It has a head adjective that is modified by other words. These other words may be determiners (e.g. I have a few **fresh** oranges.) and adverbs before or after the head adjective (e.g. He is very **happy**.), or word phrases after it (e.g. She is afraid **of that room**.). Also, an adjective phrase may have more than one head adjective.

- We placed an order for **some cheesy pizzas**.

  (adjective phrase *some cheesy*, with the head adjective *some*, modifying the noun *pizzas*)

- He was **thin, tall and grumpy**.

  (adjective phrase *tall, thin and grumpy*, with head adjectives *thin, tall and grumpy* modifying the pronoun *he*)

- The documentary film was **terribly boring**.

  (adjective phrase *terribly boring*, with the head adjective *boring*, modifying the noun phrase *the documentary film*)

B. **Underline the *adjective phrases* in this description.**

It was a cold and bleak wintry evening. The gentle murmuring breeze tapped the window blinds.

Outside, the wind lifted the yellow fallen leaves and dropped them at another lonely place. Soon white feathery flakes covered the earth, preparing us for a chilly white morning.

Verb Phrase

A verb may appear alone in a sentence, or it may be a main verb along with any modal and / or auxiliary (helping) verbs. The main verb is always placed last in the **verb phrase**.

For example:

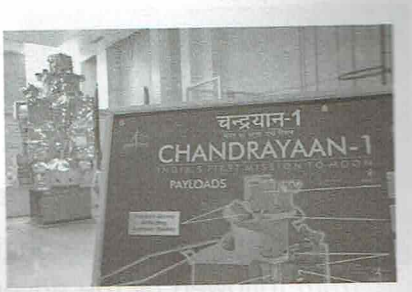
- We **can decide** today itself about the posting.

  (verb phrase *can decide* with the modal verb *can* and the main verb *decide*)
- They **would have cleared** the traffic by now.

  (verb phrase *would have cleared* with the modal verb *would*, the auxiliary verb *have* and the main verb *cleared*)
- They **have been listening** to music since evening.

  (verb phrase *have been listening* with the auxiliary verbs *have been* and the main verb *listening*)

C. Underline the *verb phrases* in these sentences.



1. The lunar mission Chandrayaan-1 was launched by India.
2. Widespread water has been detected on the surface of the moon.
3. This could make a manned base on the moon possible.
4. It will not be surprising if people start travelling to the moon.
5. International space missions have found evidence of ice on Mars.
6. None of us had expected such discoveries ten years ago.

Adverb Phrase

An **adverb phrase** is a group of words that acts as an adverb and modifies the verb in a sentence. The head of an adverb phrase is an adverb that is modified by other words before or after it.

An adverb phrase may give information about the manner, place, time, duration, frequency and degree of the verb.

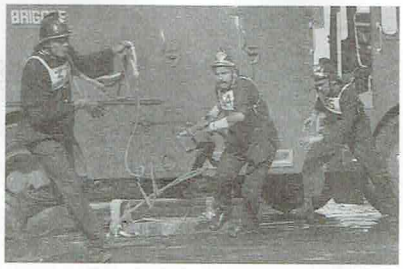
For example:

- The audience **sang very enthusiastically** with the choir. (adverb phrase of manner, with the head adverb *enthusiastically*, modifying the verb *sang*)
- This classical dancer **performs very often** in this club. (adverb phrase of frequency, with the head adverb *often*, modifying the verb *performs*)
- Nurul painted the wall **with great care**. (adverb phrase of manner, which works like the adverb *carefully*, modifying the verb *painted*)
- Nilofer had planted the sapling **at this spot**. (adverb phrase of place, which works like the adverb *here*, modifying the verb *had planted*)

D. Underline the *adverb phrases* in these sentences.

1. The train moved quite slowly as it neared the station.
2. He spoke surprisingly well though it was his debut.

3. We dine out only occasionally.
4. The firefighters got into action without any delay.
5. You should have submitted the report much earlier.
6. My grandmother looked after me with loving care.



Prepositional Phrase

A **prepositional phrase** is a group of words that begins with a preposition and is followed by a noun phrase, an adjective or an adjective phrase, or an adverb or an adverb phrase.

For example:

- There was a big pothole **on the main road.**

  (prepositional phrase beginning with the preposition *on* followed by the noun phrase *the main road*)

- I travelled by bus **from there.**

  (prepositional phrase beginning with the preposition *from* followed by the adverb *there*, functioning as an adverb phrase of place)

- The house **at the end of the street** is haunted.

  (prepositional phrase *at the end of the street*, part of the noun phrase *the house at the end of the street*)

- She talked to everyone **in a pleasing way.**

  (prepositional phrase *in a pleasing way* functioning like the adverb *pleasantly* to modify the verb *talked*.)

- The park **by the river** is very crowded in the morning.

  (prepositional phrase *by the river* functioning like an adjective to modify the subject noun *park*.)

A **prepositional phrase** may be a part of the noun phrase, or it may function as an adjective or an adverb in a sentence.

The noun phrase, the adjective phrase and the adverb phrase, each have their head noun, head adjective or head adverb, respectively, which can appear alone or with other modifiers.

For example:

- These ~~soft and chewy~~ candies are called marshmallows.

  (The modifiers *soft and chewy*, when deleted, do not affect the meaning.)

The preposition in the prepositional phrase always needs to be followed by a noun with or without modifiers.

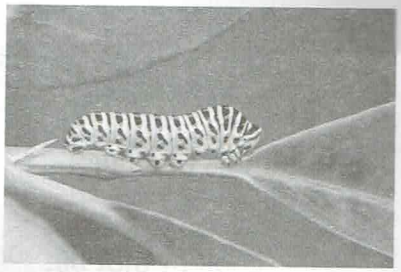
E. Fill in the blanks with suitable prepositions. Then, underline the *prepositional phrases* formed.

1. The tall tree swayed _____ side to side during the storm.
2. They have ordered _____ some furniture online.

3. They sat _____ the river _____ their fishing rods dipped in.
4. Please bear _____ a temporary disruption in your network.
5. If you take pride _____ your work, you will always give your best.
6. Sheeba is slow _____ the game and may not move _____ the next level.

F. Identify any two kinds of phrases—*noun*, *adjective*, *adverb* or *prepositional*—in each of these sentences.

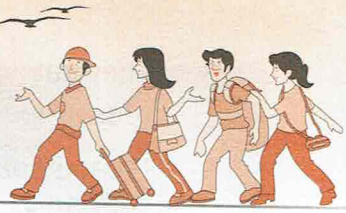
1. The teacher called me to the front of the class.
2. The small black counter in the kitchen is made of marble.
3. The crooked little cottage stands behind the school wall.
4. The hungry little caterpillar crept up the leafy stem.
5. She behaved in a ridiculous manner on the stage.
6. Stealing another's money is against the law.
7. Independent India has moved fast towards becoming a developing economy.
8. The weak-looking old man was participating very enthusiastically in the cleanliness drive.



Summary

In this chapter, we have learnt that

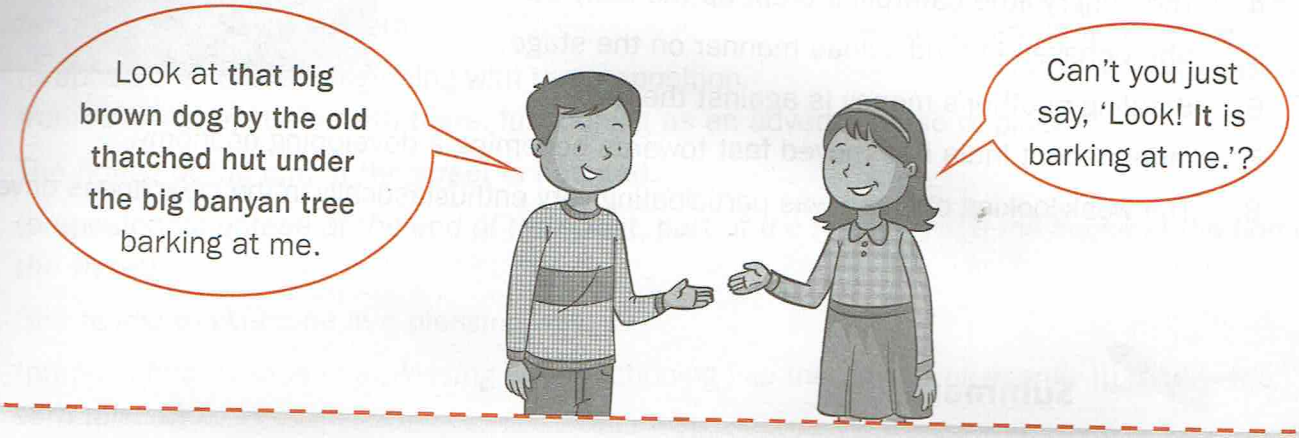
- a sentence may be made up of different kinds of phrases;
- a **noun phrase**, with a head noun, functions as the subject or as the object in a sentence;
- an **adjective phrase**, with a head adjective, functions as an adjective in a sentence;
- a verb may appear alone in a sentence, or it may be a main verb along with any modal and / or auxiliary (helping) verbs. The main verb is always placed last in a **verb phrase**;
- a **prepositional phrase** begins with a preposition and is followed by a noun phrase, an adjective or an adjective phrase, or an adverb or an adverb phrase; and
- an **adverb phrase** is a group of words, with a head adverb, that functions as an adverb in sentence.



2 Noun Phrases
Functions

Warm-up

Read this dialogue.



You just read a dialogue where the highlighted words are replaced by the pronoun **it**. The highlighted words in the first speech bubble make up a complex noun phrase.

We know that a noun phrase is a group of words that functions as a subject, an object or a complement in a sentence. It consists of a head noun and some other words before or after it.

Let us now read on to learn more about the structure of a **noun phrase**.

Structure of a Noun Phrase

A noun phrase may be structured in any of these ways.

Determiner	Premodifier	Head Noun	Postmodifier
every	Indian	**child**	
the	dark and dingy	**storeroom**	
many		**people**	in our colony
that	extremely bright	**object**	in the sky

Even if the head noun is plural,

1. its premodifiers are always singular.

   For example:

   - four **pencil** boxes
   - **staff** salaries

2. its premodifiers indicating number and measurement are always singular.

   - **four-hour** drive
   - **eight-inch** snake

Noun Phrases: Premodifiers

Words preceding the head noun in a noun phrase are called **premodifiers**. Such words may be determiners, adjectives, adjective phrases or other nouns that make up the noun phrase together with the head noun.

For example:

- **Much money** has been spent on his education. (determiner + head noun)
- **Some rude people** show no respect to their elders. (adjective phrase + head noun)
- **School education** is a must for children. (noun + head noun)

Other premodifiers in a noun phrase may be the present participle (*-ing* form of the verb, used as an adjective) and the past participle (*-ed / -en* form of the verb, used as an adjective). These precede the head noun.

For example:

- **These hanging wind chimes** are from Bhutan.
- **The hounded animal** finally escaped inside a cave.

A. Add a suitable *premodifier* to expand each noun phrase.

1. My brother studies in a _____ **school.**
2. **The** _____ **girl** was awarded a scholarship.
3. My brother solved **an** _____ **complex puzzle.**
4. _____ **citizens** actively participate in a democracy.
5. I am reading **the** _____ **novel** of J K Rowling.
6. **Most** _____ **people** exercise regularly to stay fit.
7. We cannot see **the** _____ **stars** without a telescope.
8. **This** _____ **city** is located on the banks of the Danube River.

The adverb modifying an adjective used in the noun phrase is a part of the noun phrase.

For example:

- **The brightly dressed bride** looked very attractive.

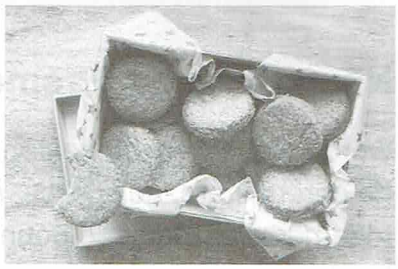
9. Gagan has been a _____ **hero** in saving the child from the house on fire.

10. We went to see **the** _____ **Rashtrapati Bhavan** on Republic Day.

Noun Phrases: Postmodifiers

Words used after the head noun in a noun phrase are called **postmodifiers**. The postmodifier in a noun phrase is usually an adjective phrase, a prepositional phrase or a relative clause.

For example:



- **The box full of cookies** was emptied by the children.

  (determiner *the* + head noun *box* + adjective phrase *full of cookies*)

- **The animals in the zoo** are regularly examined by a vet.

  (determiner *the* + head noun *animals* + prepositional phrase *in the zoo*)

- **This man with a white beard** is a renowned scientist.

  (determiner *this* + head noun *man* + prepositional phrase *with a white beard*)

- **The boy who climbs trees very quickly** studies in my class.

  (determiner *the* + head noun *boy* + relative clause *who climbs trees very quickly*)

Other post modifiers in a noun phrase may be the present participle (*-ing* form of the verb, used as an adjective) and the past participle (*-ed / -en* form of the verb, used as an adjective). These may precede the prepositional phrase modifying the noun phrase.

For example:

- **That bird <u>singing</u> on the tree** is a cuckoo.
- **Those relics <u>excavated</u> from the site** belong to the Harappan civilisation.

Relative clauses (also called adjective clauses) are introduced by the relative pronouns *who, whom, which, whose* or *that*. They add more information about a noun mentioned in the main part of a sentence.

Postmodifiers add extra information about the head noun that precedes them; they are not necessary to the meaning of the sentence.

B. Underline the *postmodifier(s)* in each sentence.

1. Boys sitting in that corner helped me fill the form.
2. Mangoes from India are famous in the world.
3. Vansh has paid back the money borrowed from his friends.
4. Lenny loves vegetables with a lot of cheese.
5. Someone daily visits the orphans in the night shelter.

6. Newspapers reporting the incident have been really bold.
7. Cottages built on the hilltop are centrally heated for winter.
8. The jar of peanut butter slipped from my hand.
9. Children cheering the team were asked not to make noise.
10. Villagers are often awed by traffic on city roads.

C. Rewrite the sentences changing the highlighted premodifiers into *postmodifiers*. The first one has been done for you.

1. This is **an interesting** topic for me.

   This is a topic of interest for me.
2. **The teak** table is an antique.
3. We bought **the world-famous Persian** carpets.
4. **A government** officer helped us.
5. That is **our recreation** room.
6. Grandpa is **a very patient** man.
7. We enjoyed **the summer** vacation.
8. **The expiry** date is printed on the flap.
9. He has been **a successful** man.
10. We should aim to live **a contented** life.

A head noun may have both premodifiers and postmodifiers.
For example:

- **The unexpected** rainfall **early in the morning** caused all delays.

premodifier ↓ head noun ↓ postmodifier

Noun Phrases: Complements

Complements come immediately after the head noun. They are usually prepositional phrases or clauses. Complements are necessary to complete the meaning of the head noun and cannot be removed. They are different from the postmodifiers that modify or describe the noun and, which can be removed from the sentence.

For example:

- **Your love for the country** is exemplary.

  (The prepositional phrase *for the country* is the complement necessary for completing the meaning of the head noun *love*.)

Noun complements are usually used with abstract nouns.

- Delhi is worried about **the rise <u>in temperature during summer</u>**.

  (The prepositional phrase *in temperature during summer* is the complement necessary for completing the meaning of the head noun *rise*.)

- **The thought <u>that you will be our leader</u>** gives us hope.

  (The clause *that you will be our leader* is the complement necessary for completing the meaning of the head noun *thought*.)

D. Underline the *noun complements* and cross out the postmodifiers in these sentences.

1. The road to Pune is very well-laid.
2. The plant with red leaves is very delicate.
3. The girl with curly hair is a good dancer.
4. Look at the picture of the man wanted for embezzlement.
5. The bottle with medicine has been labelled.
6. I got a new water bottle on my birthday.
7. The advice to the winners is to stay humble.
8. A gift of ten thousand rupees was given to each player.

A modifier that can be replaced with a relative clause without changing the meaning is a complement.

For example:

- a glass (~~which is~~) <u>of water</u> (complement)
- the glass (which is) on the table (modifier)

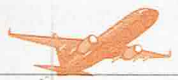
E. Underline the *noun phrase complements* in these sentences.

1. The sound of this alarm is very pleasant.
2. A fear of water is deeply rooted in me.
3. The smoke from burning leaves is harmful.
4. I appreciate the way you serve the poor.
5. He gave me an impression of being haughty.
6. The stream running down the hill joins the river.
7. Trina helped herself to a spoonful of honey.
8. The only game I enjoy is lawn tennis.
9. His claim of being innocent was rejected.
10. I was overcome with a feeling of fear.

F. Complete the noun phrases in these sentences by adding *noun complements*.

1. The beauty _____ is an attraction.
2. My bag is the one _____.
3. What is your reason _____?
4. Our hope _____ is fading now.

5. Their need _____ is quite reasonable.
6. I am looking for information _____.
7. The staff was in awe _____.
8. The joy _____ is the greatest joy.
9. Education has the power _____.
10. My passion _____ has been there since my childhood.



Summary

In this chapter, we have learnt that

- **a noun phrase** may consist of premodifiers and / or postmodifiers;
- **premodifiers** are used after the determiner but before the head noun, while **postmodifiers** are used after the head noun. Both add extra information about the head noun and can be removed from the sentence without affecting the meaning;
- **complements** are used after the head noun and they are essential to complete the meaning of the head noun; and
- a postmodifier can be removed from the sentence without changing the meaning, while a complement is essential to the meaning of the sentence.

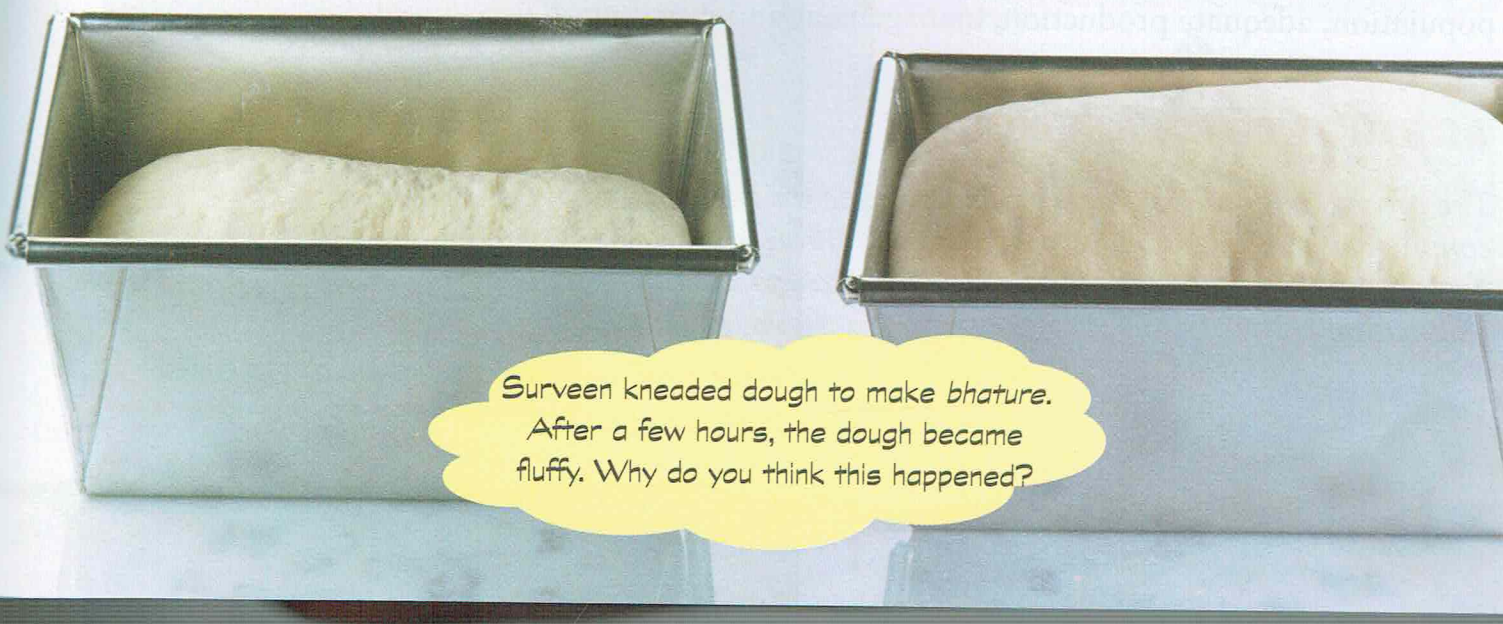
Ch1: Production of Crops

- Understand the different kinds of crops grown in India
- Understand the difference between *rabi* and *kharif* crops
- Know different methods of crop production
- Understand different methods applied in crop production

Ch2: Microorganisms

- Familiarise with microorganisms and their types
- Understand how a microscope works
- Distinguish between useful and harmful microorganisms
- Analyse the role of microorganisms in food preservation

I Wonder!



Surveen kneaded dough to make *bhature*. After a few hours, the dough became fluffy. Why do you think this happened?

Chapter

1 Production of Crops

What I Know

We eat different kinds of food, most of which we get from plants, such as cereals, fruits, pulses and vegetables. **Observe the food items given here. Tick (✔) the ones that are grown in the fields.**

Akshat's grandfather is a farmer. He has various instruments that are used to grow crops. Akshat has taken pictures of his grandfather working with different equipment in his field. Discuss what his grandfather is doing in each picture.

All living organisms need food to survive. Plants make their own food through the process of **photosynthesis**. These food items are grown in fields. In order to obtain food for a large population, adequate production, management and distribution is required.

AGRICULTURE AND CROPS

The process of growing plants on a large scale for food and commercial purposes such as medicines and fibres is called ***agriculture*** *('ager' in Latin means 'field' and 'cultura' means 'cultivation').*

HOTS

What is the branch of agriculture that deals with the production of vegetables, fruits, flowers and decorative plants called?

Plants of the same kind that are grown at the same place in large quantities are called a **crop**. Crops such as rice, wheat and barley are grown in the fields to be used as food and for other commercial purposes. *Crops such as wheat, maize and rice, that are gown for providing food are called* **food crops**. *Crops such as jute, cotton, tea and oil are called* **cash crops** *as they are grown for commercial purposes and fetch a higher profit.*

In India, crops are grown in two main seasons—summer and winter. Based on the season in which crops are grown, they can be classified into *rabi* crops and *kharif* crops.

Rabi Crops: These are the crops that are grown in the winter season during the months of October–December. These crops are harvested during March–April. Wheat, mustard, gram, barley and pea are some examples of *rabi* crops.

a. Mustard

b. Pea

Fig. 1.1 *Rabi* crops

Kharif Crops: These are the crops that are grown during the summer season from June–July and are harvested during September–October. These crops need more water to grow, hence, they are grown during monsoon. Therefore, they are also called **monsoon crops**. Rice, jute, maize, cotton, soya bean, sugar cane, *bajra*, *jowar*, millets and groundnuts are some examples of *kharif* crops.

a. Cotton

b. Groundnut

Fig. 1.2 *Kharif* crops

Crops can also be classified on the basis of the products obtained from them.The products obtained from these crops are called **produce**. Some of these crops are listed in Table 1.1.

Table 1.1 Some common examples of produce

Cereals	Wheat, Barley, Rice, Ragi, Corn, Oats
Pulses	Gram, Beans, Peas
Oil seeds	Groundnut, Sunflower, Mustard
Root crops	Sweet potato
Tuber crops	Tapioca, Potato
Sugar crops	Beetroot, Sugar cane
Plantation crops	Tea, Rubber, Coconut, Coffee
Fibre crops	Jute, Cotton

HOTS

Why is paddy (rice) not grown in the winter season?

FactAce

The seeds of a few plants such as rice are first grown in a nursery. As soon as they grow into plantlets, they are transplanted into the fields manually.

CHECKPOINT 1

A. Choose the odd one out.

a. Wheat, Mustard, Rice, Barley

b. Cotton, Jute, Rice, Pea

B. State whether the following statements are True or False. Correct the false statements.

a. Cash crops are grown for providing food. .....

b. Crops are grown on a large scale at the same place. .....

c. In the word 'agriculture', '*ager*' means 'to cultivate'. .....

d. Soya bean is a *rabi* crop. .....

e. *Kharif* crops are also called monsoon crops. .....

AGRICULTURAL PRACTICES

Crop production and cultivation involve different processes and techniques such as sowing seeds, irrigation, harvesting and storing. All these activities are called **agricultural practices**. Agriculture is a step-by-step process that involves the following steps:

1. Preparing soil
2. Sowing seeds
3. Adding manures and fertilisers
4. Irrigating the fields
5. Weeding (removing weeds)
6. Protecting crops from pests and diseases
7. Harvesting, Threshing and Winnowing
8. Storing crops

Let us understand these steps in detail.

Preparing Soil

Preparation of soil before sowing seeds is the most important step, as soil anchors the plants and provides water and nutrients to them. Hence, it is important that the soil is properly turned and loosened.

*Loosening of soil can be done by **ploughing** or **tilling**.* Ploughing can be done by using wooden or iron ploughs. These ploughs can be either pulled by animals or by machines like tractors. Nowadays, tractors are used most commonly as they make the process faster and cheaper.

Most of the times, ploughing or tilling leaves huge lumps of soil behind. These lumps are then levelled using an instrument called **leveller**. Levelling helps in the uniform distribution of soil and in proper irrigation of fields.

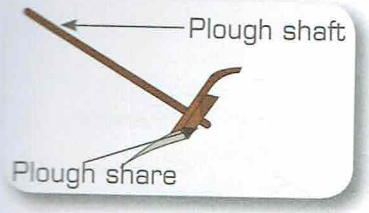


Fig. 1.3 Wooden plough

Fig. 1.4 Iron plough

Fig. 1.5 Ploughing

Fig. 1.6 Levelling

Preparation of soil has many benefits. Some of them are discussed here.

- Loosened and well-aerated soil provides air to the roots of the plants for proper growth.
- Loose soil helps the roots to penetrate deeper into the soil.
- It also aids the growth of earthworms and many useful microorganisms in the soil.
- Loosening and turning of soil exposes the nutrient-rich soil to the top, so that the plants can use the nutrients for their growth. It also enables the soil to mix uniformly with the fertilisers or the manure.

Sowing Seeds

Before sowing seeds in the fields, healthy and appropriate seeds should be selected. The seeds should be free from any diseases and should be of good quality. Proper care should be taken while sowing the seeds in the fields.

- Seeds should be sown at proper distance from each other so that plants can get adequate sunlight, water and nutrients.
- Seeds should be sown at proper depths in the soil.

HOTS

Why is 'depth' an important criterion while sowing seeds?

Seeds can be sown manually or by using seed drills. *The process of sowing seeds manually, that is, by hands is called* ***broadcasting***. Broadcasting involves the scattering of seeds by hands on the fields. The major disadvantage of this process is that the seeds are unevenly distributed on the land. This may result in wastage of seeds and struggle among the plants for growth and development.

A **seed drill** contains a funnel-shaped container that leads to long tubes. The seed drills are attached to the ploughs. The seeds are put in the funnel-shaped container. As the plough moves, it creates furrows in the soil. The seeds are released from the seed drill into these furrows and get covered with soil. Sowing seeds through the drill ensures that the seeds are sown at proper distance and with sufficient space between them.

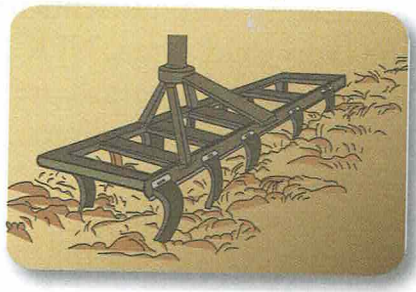


Fig. 1.7 Seed drill

ACTIVITY 1

Aim: To separate healthy seeds from unhealthy seeds.

Materials required: bean or wheat seeds, water, bowl

Procedure: Fill the bowl with water. Put some bean/wheat seeds in the water and stir gently. Keep the still for some time. Observe what happens to the seeds.

Observation: You will observe that some seeds float on the surface of water. Why do you think this has happened?

Conclusion: The unhealthy seeds are lighter in weight than the healthy seeds. Therefore, they float in water.

Adding Manures and Fertilisers

Plants take certain minerals, called **plant nutrients** from the soil for their growth. Hence, it is important to replenish the soil with nutrients. This can be done by adding manures and fertilisers to the soil.

Manure is an organic substance that is obtained from dead or decaying animal and plant waste. Manure can be made from cow dung, dead and fallen leaves, and other parts of the plants. Manure replenishes the soil and increases its fertility.

FactAce

Manures are mostly added in the soil before sowing.

Manure can be prepared by creating deep pits in the ground. Organic wastes like dead plants, fallen leaves, vegetable waste and animal waste are buried in these pits. The pits are then covered and the waste is allowed to rot for several weeks. Once the organic waste is decomposed, it forms **compost.**

Fig. 1.8 A truck dumping organic waste in field

Fertilisers are man-made inorganic substances that are used to add nutrients to the soil and enhance the crop yield. Urea, NPK (Nitrogen Phosphorus Potassium) and potash are examples of some commonly used fertilisers.

Table 1.2 Differences between manures and fertilisers

Manures	Fertilisers
Manures are organic substances made from plant and animal waste.	Fertilisers are man-made inorganic substances obtained artificially using chemicals.
These are rich in organic nutrients.	These are made inorganically or artificially to fulfil the plant's requirements of nitrogen, potassium and phosphorus.
These are biodegradable.	These are non-biodegradable.
These are heavier and bulky to transport.	These are compact and easier to transport.
These are environment-friendly and do not harm water bodies.	These cause soil pollution and water pollution.

Let us learn about some other sustainable techniques of improving the quality of soil.

Fallow field: It is a land that a farmer ploughs but does not cultivate for one or more seasons to allow the field to become more fertile again. The practice of leaving fields fallow, dates back to ancient times when farmers realised that using soil over and over again depleted its nutrients. Nutrients are replenished in the soil when dead animals and plants are decomposed by microbes.

Crop rotation: It involves the systematic growing of different crops in a succession on a piece of land to avoid exhausting the soil. For example, after growing wheat for a season, farmers prefer to grow a crop of legume family such as peas, grams and groundnuts to replenish nitrogen in the soil. Crop rotation makes soil more fertile, as legumes fix nitrogen in the soil. It helps to control weeds, diseases and pests by breaking their life cycles. It also reduces the risk of crop failure in case of drought or disease.

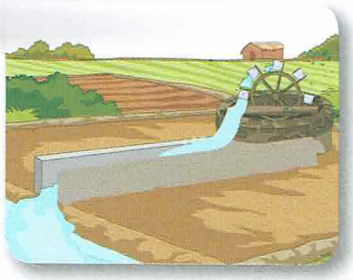
Multiple cropping: It refers to the growing of more than one kind of crops simultaneously in the same area. This can be done in a number of different ways. Two such ways are relay cropping and double cropping. In **relay cropping,** the second crop is planted even before the first crop is harvested. **Double cropping** is another form of multiple cropping where one crop is raised after the growing season for the previous crop has ended. This agricultural technique helps in maintaining nutrient levels in the soil.

Irrigating Fields

Irrigation is the process by which adequate amount of water is supplied to the crops. Irrigation can be done naturally by rains and using tube wells, wells, rivers and canals. The water from wells, canals and other sources is pumped to irrigate the fields.

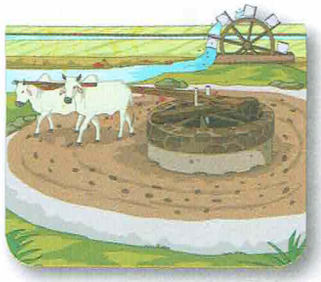
Various traditional and modern methods of irrigation are used. Some traditional methods of irrigation were *dhekli*, *rahat*, *moat* and chain pump. In these methods, irrigation was done using animals or manually. These methods were cheaper but they were not efficient. Hence, modern methods of irrigation are used nowadays.

Dhekli



Chain Pump

Moat (Pulley system)



Rahat (Lever system)

Fig. 1.9 Traditional methods of irrigation

Some modern methods of irrigation are **sprinkler system** and **drip irrigation.**

Sprinkler System

In this method, water is sprinkled in the fields using sprinklers. In sprinkler system, water is distributed in long tubes that are attached to a number of sprinklers on the tubes. This kind of irrigation system is very useful to irrigate crops growing on uneven land. The sprinklers can spray water just like rainfall to the crops growing over a large area.

Fig. 1.10 Sprinkler system

Drip Irrigation

In this method, water is allowed to fall drop by drop to the soil near the roots of the crops. This method is efficiently used in areas where water is scarce. This method is also useful as it avoids wastage of water.

Fig. 1.11 Drip irrigation

HOTS

Which method of irrigation must be used in the drought-prone areas?

FactAce

Drip irrigation is the most economical method and is employed for fruit and flower plants.

Weeding

Weeding is the process of removal of unwanted plants, called ***weeds****, from the field that compete with the crops.* Weeds such as *Amaranthus* or chulai, *Parthenium*, *Chenopodium* and wild oats can prove dangerous for the crop yield and its growth. Therefore, weeding is a necessary process. Weeding can be done manually by pulling out the weeds using a trowel or a harrow. It can also be done by using some

Fig. 1.12 Trowel

Fig. 1.13 Harrow

chemicals called **weedicides**. Weedicides such as 2,4-D (2,4-dichlorophenoxyacetic acid), butachlor, MCPA (2-methyl-4-chloro-1-phenoxy acetic acid) are sprayed on the crops. These weedicides stop the growth of weeds in the fields, thus preventing harm to the crops.

FactAce

ORGANIC FARMING

Also known as **organic gardening**, organic farming is a process introduced by Sir Albert Howard, a British agricultural scientist, in the 1930s. In this system, organic methods are employed for the cultivation of crops. This process employs the use of biofertilisers and biopesticides in fields.

Protecting Crops from Pests and Diseases

Crops tend to be attacked by organisms that damage them. These organisms such as rodents and insects are called ***pests****. These pests can be removed from crops by using chemical substances called* ***pesticides****.*

Pesticides that are used to kill rodents such as rats are called ***rodenticides****.* **Insecticides** are sprayed to kill various insects such as locusts and termites. These can be sprayed in fields manually by hand sprayers and using aircraft on large fields. DDT (Dichlorodiphenyltrichloroethane), BHC (Benzene hexachloride or Gammexane), malathion and disyston are some examples of common insecticides. Pesticides kill pests and other harmful organisms and do not harm the crops.

Fig. 1.14 Aircraft being used for spraying pesticides

In addition to the advantages, there are some disadvantages of using pesticides. Pesticides should be used with utmost care and precaution. They may cause irritation in case of contact with the skin. They are highly poisonous and pollute water and soil.

Crops often get attacked by microorganisms such as viruses, bacteria and fungi through animals, air, seeds and soil. These microorganisms infect the plants, cause diseases and affect the crop yield.

Some diseases in crops are discussed here.

- **Diseases caused by bacteria:** Wilt is a bacterial disease that results in the blockage of the xylem tissues. This interferes with the transport of water and makes the plant wilt and die.
- **Diseases caused by fungi:** Rust and smut (occur in crops like wheat, oats and barley), and blight of potato are some examples of fungal diseases.
- **Diseases caused by viruses:** Mosaic and leaf curls are some examples of viral diseases in plants.

Fig. 1.15 Rust on leaves

Pesticides when used in excess on the crops, result in soil pollution. The pesticides flow from the soil to the water bodies and cause water pollution. They also form a toxic coating on fruits and vegetables. Therefore, we must always wash fruits and vegetables before consuming them.

Fig. 1.16 Leaf mosaic

Harvesting, Threshing and Winnowing

Once the crops mature in the fields, they are **harvested**, that is, cut and gathered in stacks. Harvesting can be done manually using implements like sickle or by using machines called **harvester**. After the crop is harvested, it is collected in stacks. To make it useful, *the crop needs to be separated from the chaff. This process is called* ***threshing***. Threshing is done manually by allowing animals such as oxen or buffaloes to walk over the crop. It can also be done by machines called **threshers**. Harvesting and threshing can be done using a modern machine called **combine harvester**.

Fig. 1.17 Threshing

Once the crop is separated from the husk, it still remains mixed with it. ***Winnowing*** *is the process used to separate grains from its chaff*. Winnowing can be done manually using wind by dropping the grains from a height. The heavier seeds settle vertically downward and the lighter chaff is blown away at a distance from the seeds.

Fig. 1.18 Winnowing

Storing Crops

The harvested crop can be stored in many ways. Proper care is taken to store the crops and keep them safe till the next harvest season. The crops are stored in a way so that they remain free from spoilage and attack of pests. The seeds contain moisture in them which make them prone to spoilage. Hence, before storing the crops, extra moisture is removed from the seeds using different techniques. For small-scale storage, the seeds are dried in the Sun and then stored in gunny bags or metal bins. For large-scale storage of grains, granaries or silos are used.

The stored grains are sprayed with pesticides regularly to keep them safe from attack by pests and disease-causing microorganisms.

HOTS

Buffer stock of crops is also maintained while storing crops. What do you understand by buffer stock? Why do you think it is maintained?

Fig. 1.19 Storage of crops in silos

Chaff: Material consisting of seed coverings and small pieces of stem or leaves that have been separated from the seeds

CHECKPOINT 2

1. **Give one example of the following:**
   a. Weedicide
   b. Insecticide
   c. Instrument used to cut the crops
   d. Instrument used to remove chaff from the grains
   e. Weed
   f. Bacterial crop disease

2. **State whether the following statements are True or False.**
   a. DDT is a common insecticide. .....
   b. Compost is a manure. .....
   c. Blight of potato is a fungal disease. .....
   d. Harvesting is done after threshing and winnowing. .....
   e. Silos are used to store crops on a small scale. .....

IMPROVING CROP PRODUCTION

With an increase in human population, increasing and improving crop production has become the need of the hour. To meet the increasing demand of food, different methods have been applied to increase the crop production. To increase crop production, better seeds, better irrigation facilities and improved implements are needed. It is also important to use manures and fertilisers in adequate amount to increase the crop yield. These days, hybridised seeds are used to obtain crops with desired qualities. The process of **hybridisation** involves cross-breeding of two different varieties of desirable-quality seeds, to obtain seeds which contain the qualities of both the parent plants. The hybrid seeds provide better crop yield and are also disease-resistant.

Green revolution was introduced in India in which high-yielding seeds of wheat and rice were introduced. These varieties of seeds resulted in high yields of crops when provided with adequate supply of water, pesticides and fertilisers. Green revolution made our country self-sustaining.

ACTIVITY 2

Preparing my own herbarium.

Herbarium is a collection of preserved plant specimens used for scientific study.

Collect specimens of some crop plants and paste them in a herbarium. You can also add interesting information about the plants.

NITROGEN CYCLE

Nitrogen is an important element required by plants for their growth. Our atmosphere consists of about 78% nitrogen. Plants either utilise nitrogen present in the atmosphere or from the fertilisers. *Plants cannot use nitrogen from the atmosphere directly. Therefore, this nitrogen needs to be converted to products that can be used by the plants. This is called* **nitrogen fixation.** Plants use this nitrogen and release it back to the atmosphere. Nitrogen fixation is done by certain bacteria present in the soil. These bacteria convert atmospheric nitrogen into usable form such as soluble nitrates and nitrites. Plants use these soluble nitrates. The nitrogen is returned to the atmosphere by different kinds of bacteria.

Fig. 1.20 Leguminous crop

The process of nitrogen being used by the plants and animals, and then released back to the atmosphere is called ***nitrogen cycle***.

Nitrogen cycle involves different steps.

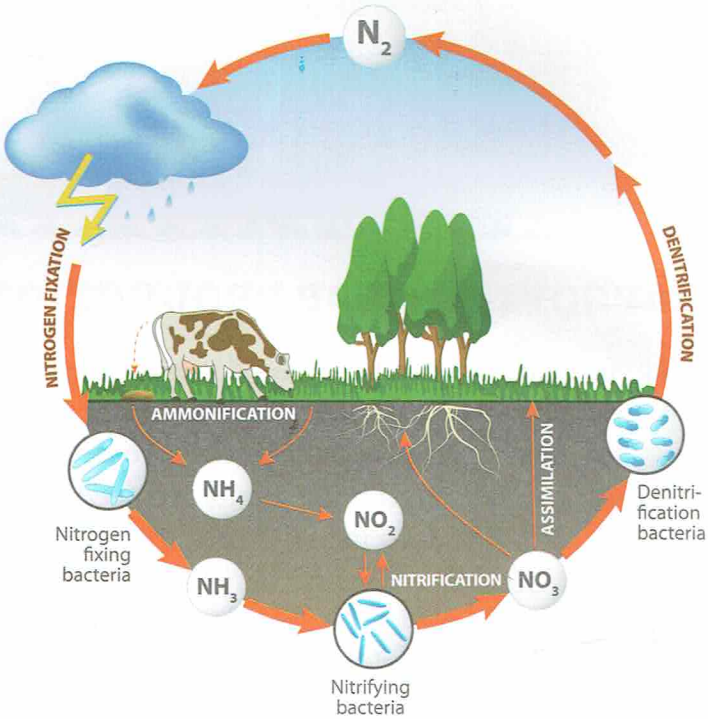


Fig. 1.21 Nitrogen cycle

Nitrogen Fixation: It is the process in which atmospheric nitrogen is converted into usable nitrogen compounds called **nitrates** by bacteria such as *Rhizobium*. These bacteria are present in the root nodules of the leguminous plants such as pea and beans. This process is called **biological nitrogen fixation.**

Atmospheric nitrogen can also be fixed by lightning. Lightning in the atmosphere results in extremely high temperatures. Due to increase in temperature, oxygen and nitrogen reacts to form oxides of nitrogen. This process is called **atmospheric nitrogen fixation.** These oxides combine with rainwater and form nitric acid. The nitric acid comes in contact with soil and forms nitrates.

The chemical reactions that take place in the process of atmospheric nitrogen fixation are:

$$N_2 + O_2 \rightarrow 2NO$$

$$2NO + O_2 \rightarrow 2NO_2$$

$$4NO_2 + 2H_2O + O_2 \rightarrow 4HNO_3$$

$$CaCO_3 + 2HNO_3 \rightarrow Ca(NO_3)_2 + H_2O + CO_2$$

FactAce

Biological nitrogen fixation is a good example of mutual relation or **symbiosis**. Both the crops and bacteria are benefitted.

Note: *NO: Nitiric oxide; NO_2: Nitrogen dioxide; HNO_3: Nitric acid; $Ca(NO_3)_2$: Calcium nitrate*

Nitrogen Assimilation: Plants absorb nitrates from the soil and convert them into organic compounds, like proteins, which are used by them. *This process of converting inorganic nitrates into organic compounds by the plants is called* ***nitrogen assimilation.***

Ammonification: Nitrogen is returned to the atmosphere by plants and animals. This happens when plants and animals die and their dead remains get converted to ammonia and other ammonium compounds. This process is called **ammonification.**

Nitrification: Some ammonium compounds are absorbed by the plants and get converted to nitrates by nitrifying bactreria. The nitrification process requires the mediation of two distinct groups: bacteria that convert ammonia to nitrites (*Nitrosomonas, Nitrosospira, Nitrosococcus* and *Nitrosolobus*) and bacteria that convert nitrites (toxic to plants) to nitrates (*Nitrobacter, Nitrospina* and *Nitrococcus*).

Denitrification: The unused nitrates obtained from nitrogen fixation, get converted to nitrogen gas by bacteria called **denitrifying bacteria**, in the absence of oxygen. *This process of conversion of nitrates to nitrogen gas is called* ***denitrification.*** *Pseudomonas* is an example of a denitrifying bacteria.

FOOD FROM ANIMALS

Animals also provide us different food items. To meet the need of food, animals like hens, buffaloes and goats are reared on a large scale. *The practice of rearing and breeding of animals on a large scale is called* ***animal husbandry****. The animals from which we get milk are called* ***milch animals****,* for example, cows and buffaloes. We get meat from animals such as chickens, goats, ducks and turkeys. Seafood is obtained from animals like fish, oysters and prawns. *The rearing and breeding of fish on a large scale is called* ***pisciculture****.* Another animal product that is consumed is honey. **Apiculture** is the large scale rearing of honeybees. The honeybees are reared and raised in places, called **apiaries.**

Fig. 1.22 A bee keeper collecting honey from a beehive in an apiary

CHECKPOINT 3

State True or False.

1. *Nitrobacter* helps in nitrogen fixation. .....
2. Sickle is used for manual harvesting of crops. .....
3. *Dhekli* is a modern method of irrigation. .....
4. Decomposed organic waste is called compost. .....
5. Rearing of honeybees is called pisciculture. .....

KEY WORDS

Agriculture: The process of growing plants on a large scale for food and commercial purposes

Crops: Plants of the same kind that are grown on a large scale at the same place for different uses

Broadcasting: The process of sowing seeds manually by hands

Irrigation: The process by which adequate amount of water is supplied to the crops

Weeding: The process of removal of unwanted plants, called weeds, from crop fields

Hybridisation: The process that involves cross-breeding of two different varieties of high quality plants

Nitrogen cycle: The process of nitrogen being used by the plants and animals, and then returning it back to the atmosphere

Pisciculture: The rearing and breeding of fish on a large scale

Animal husbandry: The practice of rearing and breeding of animals on a large scale

SUMMARY

- *Rabi* crops are the crops that are grown in the winter season during the months of October–December and harvested during March–April.
- *Kharif* crops are the crops that are grown during the summer season from June–July and harvested during September–October.
- Agriculture involves different practices such as soil preparation, sowing seeds, irrigation, weeding, harvesting and storing. All these activities are called agricultural practices.
- Fertilisers are man-made inorganic substances that are used to add nutrients to the soil and enhance the crop yield.
- Manure can be prepared by burying organic waste in deep pits made in the ground. Once the organic waste is decomposed, it forms compost.
- Some traditional methods of irrigation are *dhekli*, *rahat*, *moat* and chain pump.
- Some modern methods of irrigation are sprinkler system and drip irrigation.
- Crops can be protected from pests by using chemical substances called pesticides.
- The chaff is removed from the crop by threshing.
- For small-scale storage of seeds, the seeds are dried in the Sun and then stored in gunny bags or metal bins. For large-scale storage of grains, granaries or silos are used.

What Have I Learnt

I. Objective Type Questions.

A. Tick (✓) the correct answer.

1. Which of the following is a method of irrigation?
   a. Drip b. Ploughing
   c. Broadcasting d. Compost
2. Which of the following is a *rabi* crop?
   a. Cotton b. Soya bean
   c. Wheat d. Maize
3. Which of the following is not a *kharif* crop?
   a. Pea b. Groundnut
   c. Sugar cane d. Millets
4. Which of the following is a method of sowing seeds?
   a. Ploughing b. Broadcasting
   c. Irrigation d. Harvesting
5. *Nitrosomonas* helps in the process of:
   a. Denitrification b. Nitrogen assimilation
   c. Nitrification d. Ammonification
6. Which of the following is not an insecticide?
   a. Malathion b. Gammexane
   c. DDT d. Butachlor
7. Which of the following has nitrifying bacteria in the root nodules?
   a. Wheat b. Paddy
   c. Sugar cane d. Pea
8. Which of the following is used for large-scale storage of seeds?
   a. Silos b. Metal bins
   c. Sacks d. None of these
9. Which of the following is a disadvantage of pesticides?
   a. May cause irritation
   b. Can lead to soil pollution
   c. Form toxic coating on crops
   d. All of these

B. State True or False. Correct the false statements.

1. Ploughing helps in loosening of the soil.
2. Crop rotation is followed to improve crop yield.
3. DDT is an insecticide used in farming.
4. Compost is a kind of fertiliser.
5. The process of removing chaff from the grains is called threshing.
6. *Rabi* crops are grown in summer season and harvested in winter season.

C. Fill in the blanks.

1. ..... is the method of sowing seeds manually.
2. Wheat is a ..... crop.
3. Compost lacks in ....., ... and .....
4. ..... irrigation is used in the areas where water is scarce.
5. The rearing of honeybees is called .....

D. Choose the odd one out.

1. Millets, Groundnut, Barley
2. *Amaranthus*, Rose, Sunflower
3. Sprinkler, *Rahat*, Drip
4. Manure, Weeding, Fertilisers

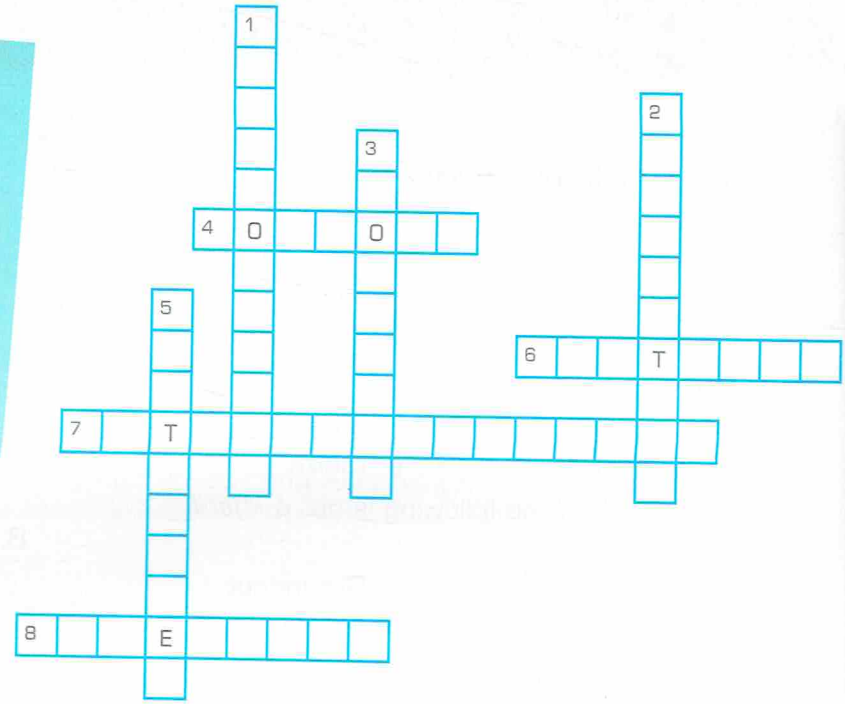
E. Use the clues to complete the crossword.

Across

4. It is formed when organic waste is decomposed
6. Growing two different crops at the same time in the field is called ..... cropping
7. Addition of atmospheric nitrates to the soil by lightning
8. Removing chaff from the seeds

Down

1. Growing two different crops one after the other
2. Providing water to the fields
3. The process of loosening of soil
5. Chemical used to kill pests



II. Short Answer Questions.

1. Define the following:
   a. Ploughing b. Harvesting
   c. Threshing d. Irrigation
2. What are the two methods of modern irrigation? Explain.
3. What do you understand by the term 'hybridisation'?
4. How are seeds stored after harvesting?
5. Define nitrogen cycle.
6. What are cash crops? Give examples.
7. What is the difference between denitrification and nitrification?
8. Define animal husbandry.

III. Long Answer Questions.

1. State the differences between multiple cropping and crop rotation. Give examples.
2. Explain nitrogen cycle with a well-labelled diagram.
3. Explain *rabi* and *kharif* crops with examples.
4. What are the advantages of ploughing the soil before sowing seeds in it?
5. How can we improve the production of crops?
6. Farmers these days use a mixture of manures and fertilisers. What do you think is the reason behind it? Explain.

7. Why are pea plants sown in a field after a crop of wheat is harvested?
8. Give reasons:
   a. Some crops are harvested in summers, others in winters.
   b. Manures are added to the soil.
   c. The soil is tilled before sowing seeds.
   d. Drip irrigation is more economical than sprinkler irrigation.
   e. Growing leguminous crops is very good for soil.
9. Distinguish between manures and fertilisers.
10. Write the equations involved in nitrogen fixation.

Subject Connect

Geography

Find out areas or states where crop rotation is most commonly used. Mark the areas/states on the political map of India. Also mark the states which are leading producers of wheat, rice, sugar cane and jute.

Enrichment Activities

I. HOTS

A. Slash and burn is a method of farming that is adopted by farmers. Find out where these methods are used. Explain the methods.

B. Mantra wants to grow some vegetables in her garden. Which kind of manure will you suggest her to use—chemical fertiliser or farm manure, or both?

II. Connect to Life

A. A look at the agricultural conditions of one of the Indian states

- Should I cook something that requires less water?
- Should I take bath for the second time in this scorching heat?
- Should I invite guests for dinner?
- Should I postpone my surgery to save money for water?

These are some of the thoughts of people living in a drought-hit city of India—Latur, Maharashtra. By April 2016, scanty amount of rainfall in Latur was the biggest cause of crop failure, that had affected both *rabi* and *kharif* crops. The reason being—the failure in crop production due to drought.

People wait every day for water tankers or stand in a long queue to pump down the water. The search for water is a very long and tedious process. The main river, Manjira, that supplies water to Latur has dried up.

Discuss in groups of 4–5 about the steps that the government of Maharashtra can take to provide relief to the people and farmers of Latur.

B. Knowing our farmers

The farmers follow a lot of planning and strategies to grow a healthy crop. Talk to the people involved in farming and farm practices. You may ask them about irrigation methods, types of manure used, tools they prefer and why, effect of temperature.

III. Research/Activity

A. Make a Compost

Divide your class into groups. Find detailed information on how compost is made. With the help of your teacher, find areas in the school where a compost pit can be made. Describe how the manure formed can be used in the school.

B. Discuss

'With increase in use of fertilisers, the quality of food products has deteriorated even though the quantity has improved'. Justify the statement. How can organic farming help in resolving this problem?

Discuss with your elders/grandparents about the changes in the agricultural practices that have taken over the past 15–20 years.

C. How did it happen?

Dr M S Swaminathan is an Indian agricultural scientist, well-known for his leading role in India's Green Revolution program. Under this program, high yielding varieties of wheat and rice seedlings were planted in the fields of poor farmers. He has further played a leadership role in introducing more such high-yielding crops. He has broadly stated his vision, that is, to rid the world of hunger and poverty.

The motivation for his career decision was the great Bengal famine of 1943. At that time, he was a student at the University of Kerala, studying zoology. The famine resulted in acute rice shortage and in Bengal, about 3 million people died from starvation. He decided to do research in agriculture in order to help farmers produce high-yield crops.

Therefore, he got admitted to another college to study agricultural sciences. Gradually, he earned the degree of doctor of philosophy (PhD) from the University of Cambridge. Dr Swaminathan is also known as the "Father of Green Revolution".

Chapter

2 Microorganisms

What I Know

Namita bought an orange and kept it in the kitchen for about five days. Circle the condition of orange expected on the sixth day.

Orange A Orange B

What might happen if Namita eats orange B?

.....

.....

Manzhar is suffering from cold and cough. The doctor has advised him to not share his food or water bottle with any of his friends. Why? Discuss.

We catch diseases due to the presence of germs in the environment.

We see a number of living organisms in our surroundings such as plants, animals and humans. But, there are also some organisms that are not visible to the naked eye.

Such organisms are too small in size and are called **microorganisms** or **microbes**. These microorgansims can be seen using a special instrument called **microscope**.

MICROSCOPE

Microscope uses a combination of lenses to make small objects appear bigger. Figure 2.1 shows different parts of a microscope.

The object to be viewed under a microscope is known as a **specimen**. The specimen is kept on a microscopic slide. This slide is kept on the stage of the microscope. We cover the specimen with a thin piece of glass, known as **coverslip**.

The lenses of the microscope are adjusted so that the microorganisms on the slide can be easily seen through the eyepiece.

HOTS

Why do we use a coverslip to cover the specimen on a microscopic slide?

FactAce

The study of microorganisms is called **microbiology** and the people who study microorganisms are known as **microbiologists**.

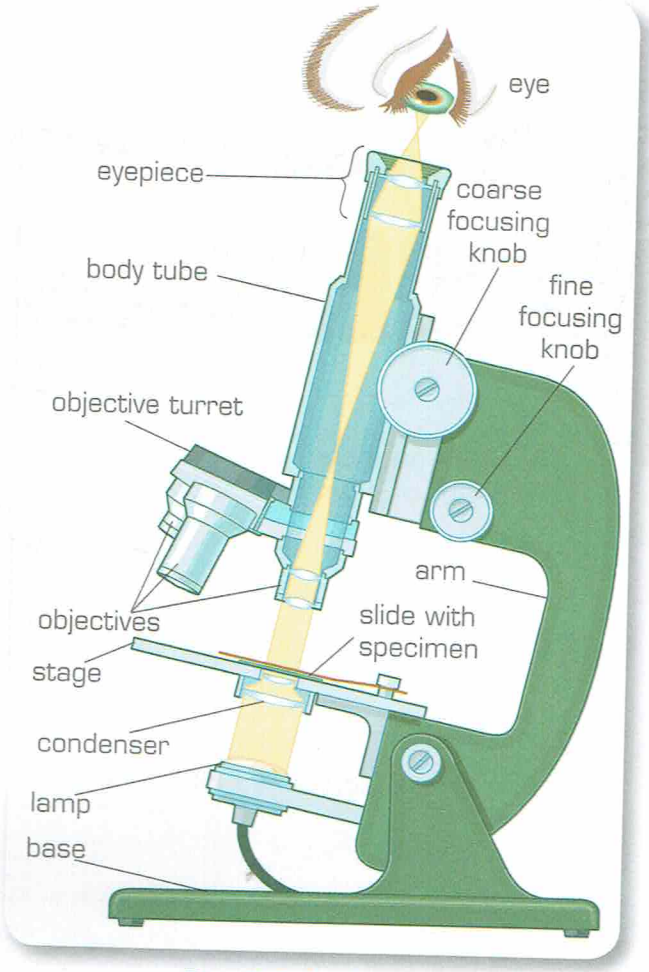


Fig. 2.1 A microscope

ACTIVITY 1

Aim: To observe microorganisms in pond water.

Materials required: pond water, dropper, slide and microscope

Procedure: Take a drop of pond water on a glass slide. Observe it carefully. Do you observe any living organisms?

Now, observe this drop under a microscope with the help of your teacher. What do you observe?

You will observe microorganisms floating in the drop of water. This activity shows that we can observe microorganisms using a microscope.

FEATURES OF MICROORGANISMS

- Microorganisms are present everywhere. They can be found on a moist piece of bread, spoilt food, decaying flower, in air and water.
- They can be found in different conditions, be it hot or cold. When the conditions are unfavourable such as too cold or too dry, the microorganisms remain in an inactive state and form a cyst around them. When the conditions become normal, microorganisms break the cyst and become active again.

- Microorganisms can be beneficial as well as harmful to us. For example, they are needed for raising dough to make bread and pizza base, and on the other hand they spoil the food.

FactAce

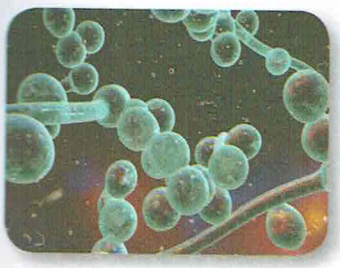
Antonie van Leeuwenhoek first observed microrganisms with the help of a newly-invented microscope.

Types of Microorganisms

Microorganisms are divided into five major categories—fungi, bacteria, viruses, algae and protozoa.

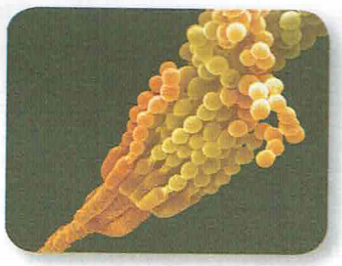
Fungi

Fungi (singular: fungus) are organisms which share a common feature with plants, that is, their cells have a cell wall. They do not have chlorophyll. Hence, they are non-green. Fungi can be unicellular (single-celled) such as yeasts or multicellular (many-celled) such as moulds. They are mostly found in warm and moist places. Some examples of fungi are yeas *Agaricus* (mushroom), *Penicillium* and *Rhizopus* (bread mould).

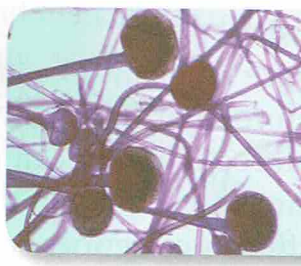


Yeast

Agaricus



Penicillium



Rhizopus

Fig. 2.2 Types of fungi

ACTIVITY 2

Aim: To observe fungus using a microscope.

Materials required: moist bread, microscope, water

Procedure: Take a piece of bread and moisten it. Do not wet it completely. Now, keep the piece in a moist place for about 4–5 days. You will observe a greenish-white substance growing on the bread. Take a small amount of this substance on a glass slide and observe it under a microscope. You will observe some thread-like structures with rounded head. This is called **bread mould**.

Bacteria

Bacteria (*singular: bacterium*) are the smallest, the oldest and the simplest known unicellular organisms on our planet. Although bacteria are mostly single-celled, but they can live in groups called **colonies**. They can be found almost everywhere such as air, water and even in food. Some bacteria are useful while some can be very harmful. Harmful bacteria, on entering our body through air or water, cause diseases like cholera and typhoid.

Bacteria can be found in different shapes such as bacilli (rod-shaped), cocci (spherical), spirilla (spiral) and vibrio (comma-shaped).

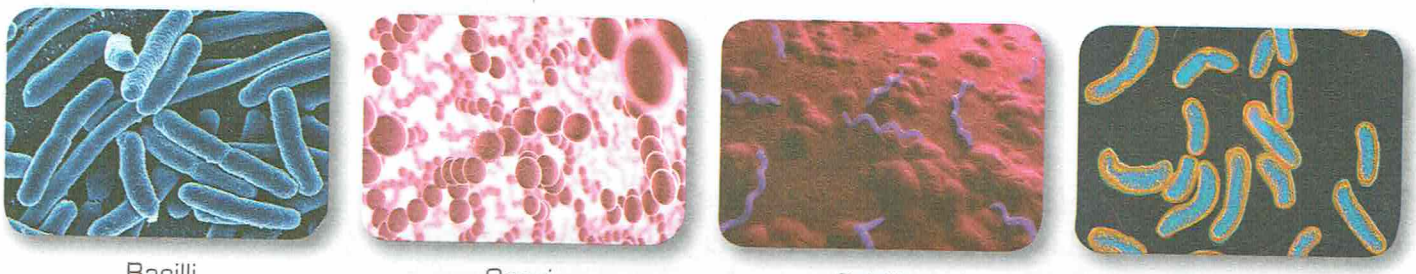


Fig. 2.3 Different shapes of bacteria (as seen under microscope)

Algae

Algae are plant-like organisms, as they have a cell wall as well as the green pigment chlorophyll. They can exist as unicellular or multicellular organisms. Due to the presence of chlorophyll, they can photosynthesise. Some algae have colour pigments like green and blue. Therefore, based on the colour of the pigment present in the algae, they can be classified into different categories such as green algae, blue algae, red algae, brown algae and blue-green algae. Some examples of algae are *Spirogyra*, seaweeds, *Chlamydomonas*, *Volvox*, *Chlorella* and diatoms.

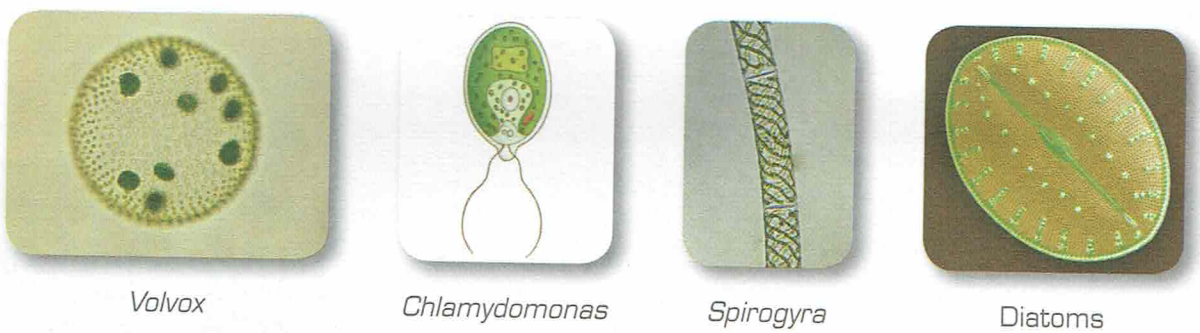
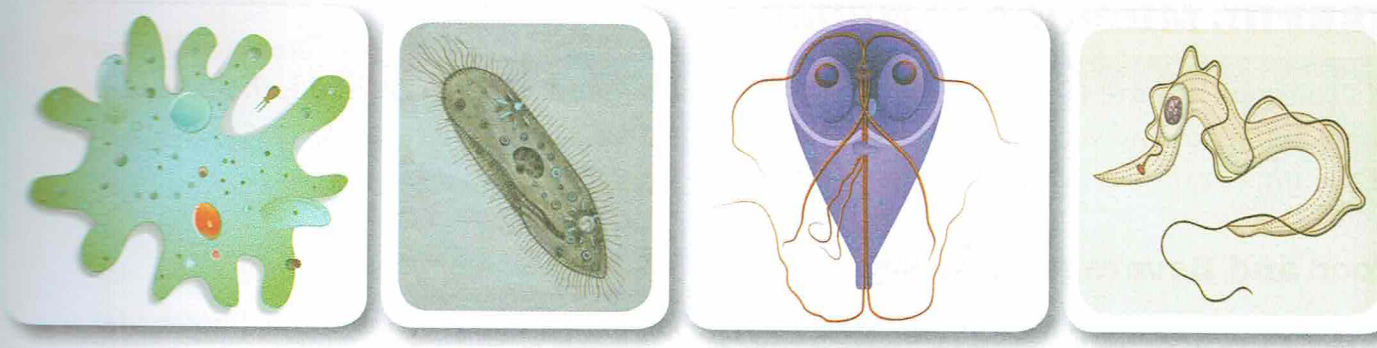


Fig. 2.4 Types of algae

Protozoa

Unlike other microorganisms that we have read about, protozoa are the unicellular microorganisms that have animal-like characteristics. They can move from one place to another and can hunt their food. They are mostly aquatic but can also be found in soil and in bodies of other organisms. Such protozoa that live in the bodies of other organisms are called **parasites**. Hence, they also have parasitic mode of nutrition which means that they derive their food from the host body without benefitting the host. Some common examples of protozoa are *Amoeba*, *Paramecium*, *Giardia*, *Trypanosoma* and *Plasmodium*.



Amoeba | Paramecium | Giardia | Trypanosoma

Fig. 2.5 Types of protozoa

Viruses

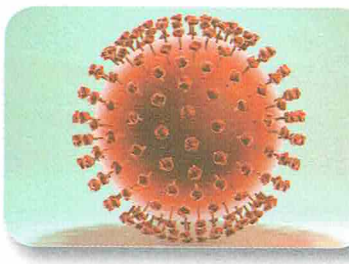


Fig. 2.6 A virus

Viruses are one of the smallest microorganisms. They are so small that they cannot be seen even through an ordinary compound microscope. The name virus is derived from a Latin word meaning 'poison'. To observe viruses, special microscopes called **electron microscopes** are used.

Viruses do not possess a cellular structure like other living organisms and are considered between living and non-living organisms. They remain in an inactive state when outside the host body. This means that they are not capable of growing, moving or reproducing. However, as soon as they enter a living organism, they become active and derive the energy of the host cells to divide themselves, grow rapidly and reproduce inside the body of the living organisms, resulting in various diseases.

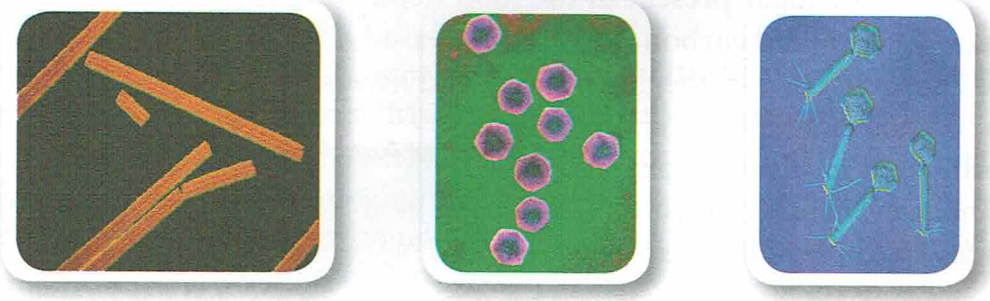
There are a number of diseases caused by viruses in both plants and animals.

- **Plants:** Tobacco mosaic virus affects leaves of tobacco plants, barley dwarf virus affects the barley crop and cucumber mosaic virus affects the leaves of cucumber plants.
- **Animals:** Some diseases caused by viruses in animals are foot and mouth disease and rabies.
- **Humans:** Polio, swine flu, herpes and cold and cough are caused by viruses.

There are some viruses that can infect bacteria, called **bacteriophage**.

FactAce

Zika fever is a viral disease that is caused by bites of mosquitoes that carry Zika virus. The disease is named after a forest called Zika. The disease had a significant outbreak in 2015, in Brazil.



Tobacco mosaic virus | Adeno virus | Bacteriophage

Fig. 2.7 Types of viruses

USEFUL MICROORGANISMS

Microorganisms are considered both a boon and bane to us. On one hand, they are useful in many activities and on the other hand, they also cause deadly diseases. Let us explore some of the important uses of microorganisms.

Food and Beverage Industry

Microorganisms are put to use in large scale production of many food items like curd, cheese, breads, jellies and batter for food items like *idlis* and *dosas*.

ACTIVITY 3

Aim: To understand the role of microorganisms in making curd.

Take some warm milk in a bowl. Add a teaspoon of curd to it. Stir the milk gently and cover the bowl. Keep the bowl undisturbed for 4–5 hours or overnight at a warm place.

You will observe that the milk has turned into curd. Take a drop of curd and observe this under a microscope.

How do you think milk changes into curd?

Milk changes to curd due to the presence of a bacteria called *Lactobacillus acidophilus*. The curd that we added to the milk in the above activity contained *Lactobacillus acidophilus*. The protein called 'casein' present in the milk coagulates in the presence of *Lactobacillus* and forms a solid mass.

Acetobacter, a bacteria, is also used to make vinegar, wine and fruit juices. Yeast is also used in breweries to make beverages such as wine and beer. These microorganisms convert the sugar to an acid or alcohol. This process in which microorganisms convert the sugar to alcohol is called **fermentation**. Wine is prepared by the fermentation of grapes whereas beer is obtained by the fermentation of barley.

Yeast is also used to set dough to make food items like breads and pizza base. This also involves fermentation of sugar present in the food item. During fermentation, the sugar breaks down to form an alcohol and carbon dioxide is released. Due to the release of carbon dioxide gas, the dough rises. On baking, the gas releases and leaves pores behind. This is why we see small pores on breads. Some bacteria are also used to make the final product in tobacco, and in coffee industry. Mushroom, a fungus, is also commonly used as a food item.

FactAce

The gritty texture of a toothpaste is due to the presence of the shell of diatoms.

CHECKPOINT 1

A. Match the following.

1. Tobacco mosaic	a. Bacteria
2. *Bacilli*	b. Algae
3. *Chlorella*	c. Virus
4. *Agaricus*	d. Fungus
5. *Amoeba*	e. Protozoa

B. State whether the following statements are True or False.

1. Viruses can be seen only through electron microscope.
2. Fungi can be found in many shapes.
3. Algae can make their food by the process of photosynthesis.
4. Fungi and algae are non-green microorganisms.
5. Foot and mouth disease is a viral disease of animals.

ACTIVITY 4

Aim: To study fermentation of sugar into alcohol by the action of yeast.

Materials required: sugar, cups, lukewarm water, yeast

Procedure: Take lukewarm water in a cup and add 3–4 teaspoons of sugar to it. Stir it well. Now, add half teaspoon of yeast to this solution. Cover the cup and keep it undisturbed for about 5–6 hours.

After the said time, open the lid. You will smell alcohol.

The yeast, that we added, fermented the sugar in the cup and converted into alcohol.

Medicinal Uses

Microorganisms play a vital role in making medicines. They are used to make different antibiotics and vaccines to combat deadly diseases.

Antibiotics: Antibiotics are the most commonly prescribed medicines to cure bacterial diseases in plants, humans and animals. Microorganisms like bacteria and fungi are used to make antibiotics that are used to cure a number of diseases. The famous scientist, Alexander Fleming discovered that *Penicillium*, a fungus, can be used to cure diseases. Therefore, he made penicillin using *Penicillium*. *Streptomyces* bacteria are also used to produce streptomycin and tetracycline antibiotics.

Vaccines: Our body has a natural defence action (immune system). When a microbe enters our body, it produces special disease-fighting substances called **antibodies**. The disease-causing microbe is called **antigen**. Therefore, every time an antigen enters our body, the immune system fights back by producing antibodies. These antibodies remain in our body and fight against disease-causing antigen in the future.

Vaccines contain dead or weakened microbes. When a vaccine is injected or swallowed, our body produces antibodies in response to the injected antigens. These antibodies remain in the body to fight the antigen and protect the body from any future infections. Therefore, the body becomes immune to the diseases. The administration of vaccines is called **vaccination** or **immunisation**.

FactAce

When we are suffering from an infection, the doctor prescribes antibiotics. These antibiotics have to be taken in right amount and at the right time. Even if we feel better, we should complete the course of antibiotics prescribed by the doctor.

HOTS

Shouvik was advised to take antibiotics for 5 days continuously to get rid of a bacterial infection. He felt better on the second day and hence, did not take the medicine thereafter. On the fourth day, the infection reappeared and in a rather aggressive form. Why do you think this happened?

In Agriculture

As we have learnt in the previous chapter, bacteria, such as, blue-green algae and *Rhizobium* help plants in fixing atmospheric nitrogen to usable nitrogen compounds. They also make the soil rich in nitrates, thereby, increasing its fertility.

In Cleaning the Environment

Different microorganisms like bacteria and fungi help in decomposing the organic waste and converting it into manure. These microorganisms grow on the dead and decaying waste and also take nutrition from it. In this way, they decompose the waste and convert it into useful products, like, manure that can be used in agriculture or gardening. If there were no microorganisms, then we would have been seeing heaps of garbage and dead and decaying waste in and near our homes. Therefore, microorganisms are necessary to maintain a clean and healthy environment.

Algae grow mostly in water. They photosynthesise and produce oxygen which is utilised by aquatic animals.

Other Uses of Microorganisms

- Diatoms are used to make crockery and other building materials.
- Many bacteria are used in tanning and leather industries.
- Bacteria are also involved in the process of retting during the production of jute where they help in the separation of fibres from other plant tissues.
- Seaweeds and phytoplanktons are used as food by many animals.

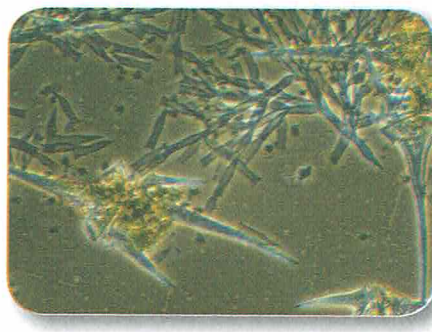


Fig. 2.8 Phytoplanktons

- Certain bacteria help in the digestion of cellulose in ruminants such as cow and buffalo. These bacteria are present in the stomach of these animals which breakdown the grass into simpler substances and thus help in digestion.
- Vitamin B capsules are produced using bacteria and yeast.
- To treat diabetic patients, insulin is also produced using bacteria on an industrial scale.

HARMFUL MICROORGANISMS

Microorganisms cause many diseases in humans, animals and even plants. They can enter the body of the host organism through different modes such as air, water, food, insects, cuts and wounds, and direct contact. All these modes are called **modes of disease transmission.** The microorganisms that cause diseases are called **pathogens** or germs.

HOTS

Anil did not cook the chicken properly. He ate undercooked chicken. After some time, he complained of stomach ache, vomiting and giddiness. The doctor confirmed that Anil is suffering from food poisoning. How do you think Anil got food poisoning and why?

The diseases that spread from an infected person to a healthy person are called **communicable diseases.** Cold and cough, tuberculosis, cholera and malaria are some examples of communicable diseases that get transmitted through different modes of transmission.

Diseases in Human Beings

Through air: Cold and cough and tuberculosis are the examples of some diseases that can get transmitted from an infected to a healthy person through air. The pathogens of these diseases enter the air when the infected person coughs or sneezes. The healthy person who breathes the infected air also suffers from the disease.

Through insects: The diseases that are transmitted through insects such as flies and mosquitoes are called **vector-borne diseases.** Flies sit on dirty and unhealthy places like garbage or drains, and carry germs attached to their bodies. They transfer these germs to the food items they sit on.

Retting: place (flax, hemp, or jute) in a liquid so as to promote loosening of the fibres from the woody tissue

They carry the harmful microbes passively and are called **carriers**. On consumption of infected food and water, a healthy person gets infected with the disease. Typhoid and cholera are some examples of the diseases caused by consumption of infected food and water. Similarly, mosquitoes bite an infected person and transfer the disease to a healthy person through a bite. Malaria and dengue are transmitted through mosquito bites. Female *Anopheles* mosquito is the vector of malaria, and *Aedes* mosquito spreads dengue fever.

A pathogen completes a part of its life cycle in the vector.

Through cuts and wounds: Tetanus is a disease caused by the bacterium, *Clostridium tetani*. The bacteria enters the body through a break in the skin such as cut or wound.

Table 2.1 Diseases in humans, pathogens and the mode of transmission

Disease	Pathogen	Mode of transmission	Prevention
Cholera	Bacteria	Consumption of infected water and food	Vaccination/avoid eating uncovered food and water
Chickenpox	Virus	Contact with infected clothes, towels, etc.	Vaccination/Try to stay away from the patient (suffering from chicken pox) and their belongings
Polio	Virus	Consumption of infected water	Vaccination
Typhoid	Bacterium	Consumption of infected water	Adopting proper sanitation habits
Tuberculosis	Bacterium	Infected saliva or sputum	Vaccination
Ringworm	Fungus	Direct contact with the infected person	Good hygiene/using prescribed antibiotics and creams
Common cold	Virus	Air	Washing hands properly/ using a handkerchief while sneezing
Diarrhoea	Bacterium	Consumption of infected water and food	Avoiding uncovered/street food
Malaria	Protozoa	Contact with infected clothes, towels, etc.	Not letting mosquitoes to breed in stagnant water
Rabies	Virus	Animal bite by infected animals such as dog or cat	Not teasing stray animals, getting the animal/pet vaccinated

Vector: a living organism that harbours the harmful microbe in its body

Diseases in Animals and Plants

Microorganisms cause diseases in animals. Foot and mouth disease, anthrax, fin rot and rabies are some examples of microbial diseases in animals.

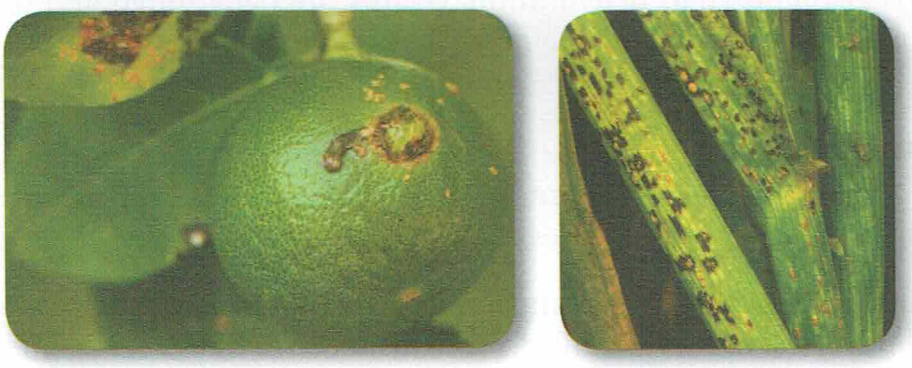
Citrus canker, tobacco mosaic, cucumber mosaic, rust of wheat and yellow vein mosaic are some examples of microbial diseases in plants.

Table 2.2 Diseases in animals, pathogens and modes of transmission

Disease	Affected animal	Pathogen	Mode of transmission
Foot and mouth disease	Cattle	Virus	Contaminated air and water, contact with diseased animal
Anthrax	Grazing animals	Bacterium	Contact with infected animals
Rinderpest	Cattle	Virus	Contaminated air and water, contact with infected animal
Fin rot	Fish	Bacterium/Fungus	Contaminated water, injury
Rabies	Cats, dogs and human beings	Virus	Animal bites such as dog bite or cat bite

Table 2.3 Diseases in plants, pathogens and their mode of transmission

Disease	Causative pathogen	Mode of transmission
Citrus canker	Bacterium	Air
Tobacco mosaic	Virus	Insects
Yellow vein mosaic	Virus	Insects
Rust of wheat	Fungus	Air, infected seeds
Loose smut	Fungus	Air



Citrus canker Rust of wheat

Fig. 2.9 Some microbial diseases in plants

SPOILAGE OF FOOD

Apart from causing diseases in humans, plants and animals, the microbes are also responsible for spoilage of food. Food spoilage is done mostly by bacteria and fungi. These microorganisms contaminate food under favourable conditions such as warmth and moisture. These microorganisms grow and produce toxic substances in the food items. Consumption of contaminated food may result in diseases such as diarrhoea and cholera, which may sometimes prove fatal.

ACTIVITY 5

Aim: To observe a papaya mould.

Take a papaya and leave it undisturbed, in open, for a few days. You will observe white cotton-like mould growing on the papaya. Pick a very small amount of this mould using forceps, place it on a slide. Cover the specimen with a coverslip and observe under a microscope. Record your observations.

You can repeat the same activity with the food items like tomatoes, grapes and orange. Observe the difference between the mould on grapes and tomato.

FOOD PRESERVATION

Food can be prevented from spoilage by microorganisms in a number of ways. Prevention of food from getting spoilt, using different methods is called **food preservation**. Food preservation involves application of different methods to kill the microbes present in the food and hence not allowing them to re-grow.

Drying or Dehydration: Since microorganisms grow in moist conditions, it is important to dry food items like seeds before storing them. Removing moisture or extra water content from food items is also known as **dehydration**. Grapes are dehydrated and stored in the form of raisins. Many vegetables and seeds are dried in the Sun to remove moisture from them. Other food items that are preserved by dehydration are cereals, dry fruits and spices.

Sweetening and Salting: Addition of sweet and salt to food items helps in removing water from them. Sweetening is used to make *murabbas*, jams, jellies and squashes. Salting is used to prepare pickles, sauces and purees. Fish, meat and chips are also preserved by salting.

Heating: Heating food items to high temperatures kills the microorganisms present in them. Milk is preserved using the technique called **pasteurisation**. In this process, milk is first heated to a very high temperature and then cooled rapidly to very low temperature. This heating and rapid cooling kills the microorganisms. The milk is then packed and sold. This process increases the shelf life of milk. Pasteurisation was discovered by French chemist, Louis Pasteur.

Using Chemical Preservatives: Many food items are stored using chemicals like sodium benzoate and potassium metabisulphite. These chemicals remove the oxygen content from the food items, thus preventing the growth of microbes. These chemical preservatives are used to preserve jams, ketchups and squashes.

Canning: Once the food items are sterilised, they are stored in airtight jars and cans to prevent re-growth of the microbes.

Freezing: Food items like fruits, vegetables, meat and fish can be stored by freezing them in deep freezers. Freezing does not allow microbial growth and keeps the food item preserved for a very long time.

Dry fruits

Canned food

Frozen pea

Fig. 2.10 Food preservation

KEY WORDS

Microorganisms: Also called microbes, these organisms are visible only through a microscope

Microscope: An instrument used for observing and imaging very minute objects that are otherwise invisible to the naked eyes (microscope has lenses)

Bacteriophage: The viruses that attack bacteria

Fermentation: The process in which microorganisms change the sugar to alcohol

Antibodies: The disease-fighting substances produced by our bodies

Antigen: The disease-causing microbe

Vaccination or **Immunisation:** The process of administering a vaccine

Food preservation: The techniques and processes involved to preserve food

Pasteurisation: The process of heating milk and then cooling it rapidly to low temperature to prevent growth of microorganisms

SUMMARY

- Micoorganisms are the organisms that cannot be seen through naked eye. They can only be seen with the help of a microscope.
- Microorganisms are divided into five major categories—fungi, bacteria, viruses, algae and protozoa.

- Bacteria can be found in different shapes such as bacilli (rod-shaped), cocci (spherical), vibrio (comma-shaped) and spirilla (spiral).
- Viruses are so small that they can only be seen with special electron microscopes.
- Virsues are considered to possess characteristics of both living and non-living organisms.
- Microorganisms have been put to use in large scale production of many food items like curd, cheese, breads, jellies and batter for different food items.
- Microorganisms are used to make different antibiotics and vaccines for many diseases.
- Microorganisms help in maintaining the nitrogen cycle in nature.
- Microorganisms like bacteria, fungi and protozoa help in decomposing the organic waste and converting it into manure.
- To prevent spoilage and contamination of food, different food preservation techniques are used.

What Have I Learnt

I. Objective Type Questions.

A. Tick (✓) the correct answer.

1. Which of the following is not a protozoa?
   a. *Amoeba* b. *Giardia*
   c. *Trypanosoma* d. *Volvox*
2. Which of the following can only be seen through an electron microscope?
   a. Bacteria b. Virus
   c. Protozoa d. Algae
3. Which of the following is a virus?
   a. Bacteriophage b. Rabies
   c. *Amoeba* d. Yeast
4. Which of the following causes diseases?
   a. Preys b. Antigens
   c. Pathogens d. Antibodies
5. Which of the following is used to make *idli* dough?
   a. Batter b. Flour
   c. Cheese d. Juice
6. Which of the following can make their own food by the process of photosynthesis?
   a. Virus b. Algae
   c. Protozoa d. Fungi
7. Which of the following is a vector of malaria?
   a. *Anopheles* mosquito b. Flies
   c. *Aedes* mosquito d. Bees
8. Which of the following is used in the production of wine?
   a. *Giardia* b. *Paramecium*
   c. Yeast d. *Agaricus*

B. Choose the odd one out.

1. Algae, fungus, virus, bacteriophage
2. Canning, sodium benzoate, heating, freezing
3. Typhoid, tuberculosis, common cold, cholera
4. Anthrax, Fin rot, foot and mouth, citrus canker
5. *Amoeba*, coccus, *Bacillus*, *Vibrio*

C. State whether the following statements are True or False.

1. Microorganisms can be seen through naked eyes.
2. Microorganisms are always harmful to us.
3. Diseases that can be transmitted from one person to another are called communicable diseases.
4. Vibrio is a rod-shaped bacterium.
5. Viruses are considered to be both living and non-living.
6. Antigens are produced by our body when microbes enter our body.
7. Microbes are used to produce antibiotics and vaccines.

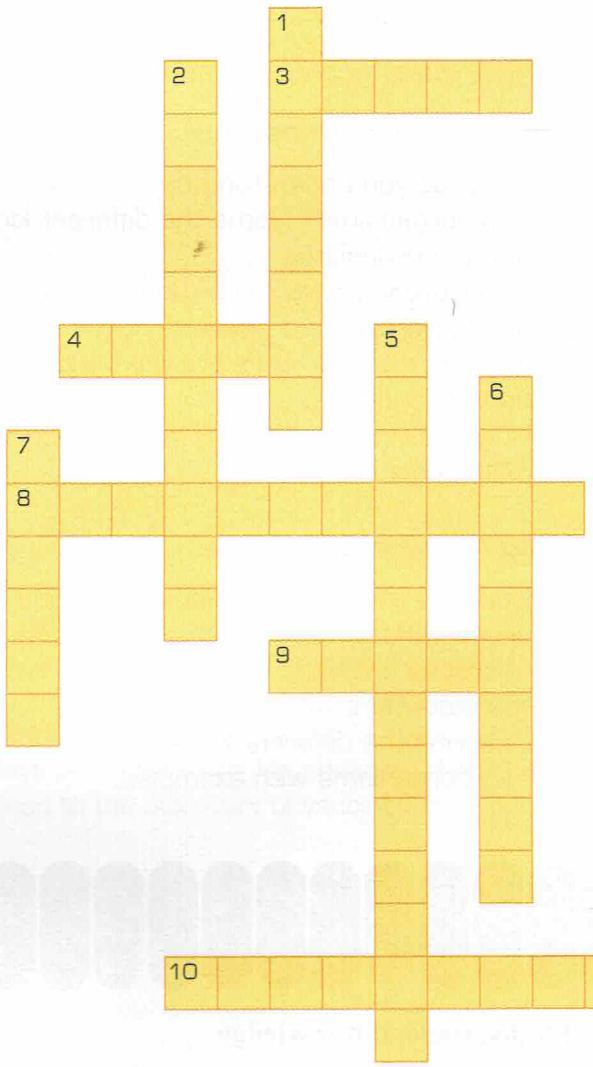
D. Use the clues to complete the crossword.

Across

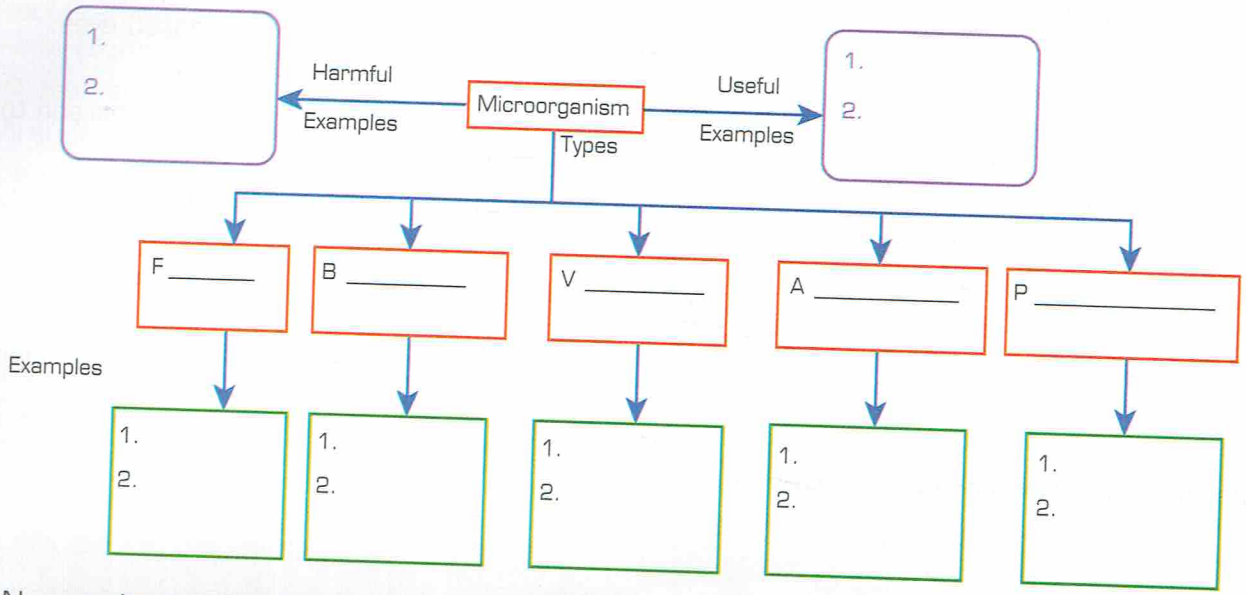
3. plant-like organisms that have cell wall and chlorophyll
4. plant-like organisms that do not have chlorophyll, but have a cell wall
8. the most commonly prescribed medicines these days to cure microbial diseases in plants, humans and animals
9. the name of this microorganism is derived from a Latin word meaning 'poison'
10. bacterium that helps plant in fixing atmospheric nitrogen

Down

1. organisms that cause diseases like cholera and typhoid
2. the process of administration of vaccines
5. a method of food preservation as discovered by Louis Pasteur
6. an instrument to see microorganisms
7. disease caused by animal bite such as of dog or cat



E. Complete the concept map.



Now, make a concept map on food preservation methods.

II. Short Answer Questions.

1. What do you understand by microorganisms? Name the different kinds of microorganisms.
2. What are vaccines? How do they help in the prevention of a disease?
3. What is the difference between antigens and antibodies?
4. How are viruses different from other microorganisms?
5. What are communicable diseases? Give examples.
6. In how many shapes do bacteria exist? Name them.
7. List any 5 uses of microorganisms.
8. Define pasteurisation. Where is it used?
9. 'Viruses are considered to be on the borderline of living and non-living'. Justify.
10. Name any two diseases caused by microbes in plants, animals and humans each.

III. Long Answer Questions.

1. Describe the different methods of food preservation.
2. Microbes are both bane and boon. Justify the statement with examples.
3. Describe the different kinds of microorganisms with examples.
4. Name the microbial diseases, causative agents and mode of transmission in:
   a. Animals b. Plants c. Humans
5. Why is bread soft and has pores? Explain in detail.
6. 'Microbes help in cleaning the environment and maintaining nitrogen balance in nature'. Explain.

Subject Connect

Maths, General Knowledge

Find out the cases of dengue in 2014 and 2015. Is there a decrease or increase in the number of patients? Create a graph using the data. Explore the causes and the ways to prevent this disease.

Enrichment Activities

I. HOTS

1. Riya's mother used to wrap the curd container in a cloth and keep it inside a hot case during the winter. But, in summers, she keeps the container outside to set the curd. Give reasons.
2. Rachita boiled milk. She allowed it to cool down and left it in the kitchen. The next morning she observed that the milk got spoiled. Why? How could have she saved the milk from getting spoiled? Discuss.

II. Connect to Life

1. With the help of your teacher, carry out a 'Clean Drive' initiative in your school. Observe places where water is getting accumulated and places where there are chances of hiding or breeding mosquitoes. Under the supervision of your teacher, clean those places to save your friends from dengue or malaria.
2. Conduct a role play.
   Have a role play on how dirty environment invites germs and diseases. How does cleanliness hel avoid various diseases?
3. Conduct an Internet research on 'Swachh Bharat Abhiyaan'.

III. Research/Activity

A. Activity: To make batter for *rava idli*

Take two cups of *rava* or *sooji* in a deep and big bowl. Now, add two and a half bowls of curd to it. Mix the ingredients using a spoon or beater. Now, add one teaspoon of cooking oil, one teaspoon of antacid or baking soda and a pinch of salt. Mix them well. Your batter is ready. You can also mix vegetables in the batter to make stuffed *idlis*.

Take *idli* mould and put the batter in each mould. Keep it in a microwave oven for about 3 minutes. Your delicious *idlis* are ready.

B. How did it happen?

Edward Jenner was an English scientist who discovered vaccine for smallpox. He was an expert in Biology and had also contributed to clinical surgery. In the 18th century, there was an outbreak of smallpox which took lives of thousands of people. Jenner observed that people who had already suffered from cowpox, contracted from cattle, could not be affected by smallpox. Around May 1796 Jenner took matter from cowpox lesions of a patient and inoculated it to a boy, named James Philip, who never had smallpox. Philip suffered from smallpox and recovered in about 10 days. Jenner inoculated Philip again with the matter after a few days of his recovery. He observed that Philip did not suffer from the disease this time. This incident lead to the discovery of vaccination for smallpox.

GO GREEN!

Form groups and organise a street play to create awareness among students on the spread of dengue and malaria especially during monsoons, and how to prevent it.

TEST PAPER 1

A. Very Short Answer Questions.

A. Fill in the blanks.

1. Fungi are ..... microorganisms without chlorophyll.
2. *Chlorella* is an example of .....
3. Conversion of sugar into alcohol by microorganisms is called .....
4. *Kharif* crops can also be called ..... crops.
5. ..... is a traditional method of irrigation.
6. ..... is a viral disease in plants.

B. State True of False.

1. *Pesticides must be used with care and precaution.*
2. *It is important to remove extra moisture before storing the crops.*
3. *Alexander Fleming discovered Penicillium.*
4. Blue-green algae destroy the green plants.
5. Vector-borne diseases spread through air.

B. Short Answer Questions.

1. Which microorganism causes tetanus?
2. Name the nitrogen-fixing bacteria.
3. What do you get on decomposition of organic waste?
4. By which method loosening of soil is done?
5. Name a disease caused by fungus.
6. Which germ is a potential biological weapon?
7. Name a microbial disease of plants.
8. What is the mode of transmission in tobacco mosaic disease?

C. Long Answer Questions.

1. Write an experiment to study fermentation by the action of yeast.
2. Write a short note on the importance of vaccines and the roles played by microbes in them.
3. What are the step-by-step activities of agricultural practices? Elaborate.
4. Explain on what basis *rabi* and *kharif* crops are divided in India.
5. Write four differences between fertilisers and manures.
6. What is multiple cropping? Why is it done? What are the different ways to do it?
7. What are the different types of microorganisms? Elucidate with the help of two examples each.

D. Give Reasons.

1. Sometimes microorganisms are useful to us. How?
2. It is impossible to study the world of microbes without a microscope. Why?
3. Manure is better for soil than fertiliser. Why?
4. Why is extra moisture removed from crops before storage?
5. *Lactobacillus* is important for us. How?

Ch3: Synthetic Fibres and Plastics

- Understand what are synthetic fibres
- Distinguish between the different types of synthetic fibres
- Analyse the advantages and disadvantages of synthetic fibres
- Understand what are plastics and what are their uses
- Evaluate the impact of plastic on our environment
- Explain the action of conservation against the use of plastic

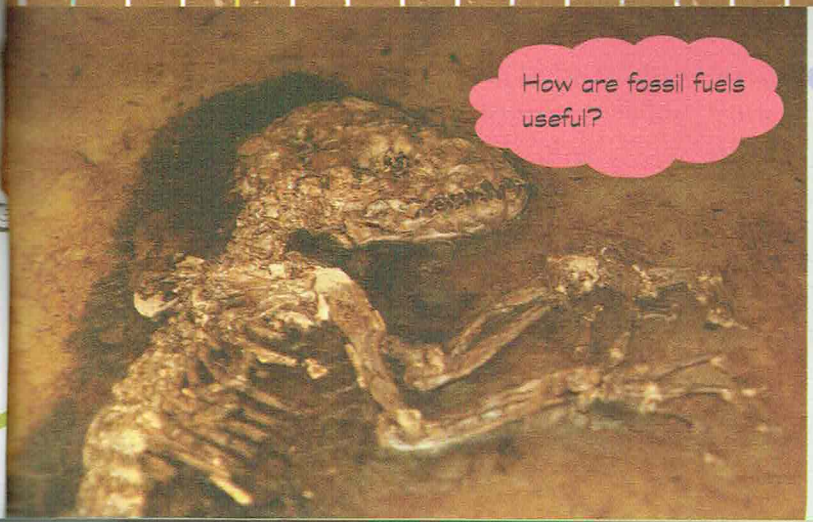
Ch4: Metals and Non-metals

- Understand the meaning of metals and non-metals and their occurrence
- Understand the physical and chemical properties of metals and non-metals
- Understand the reactivity series of meta
- Understand the common uses of metals and non-metals
- Understand the meaning of noble metals and alloys
- Understand the process of corrosion of metals, rusting of iron and its prevention

Ch5: Combustion and Fuel

- Understand what are natural resources and exhaustible and inexhaustible resources
- Study about coal and petroleum and how they are formed
- Know what is combustion (its products and conditions necessary for combustion)
- Compare the different types of combustion
- Determine fuel efficiency
- Understand what are the characteristics of a good fuel
- Analyse the impact of burning fuels.

I Wonder!



EMMANUEL SCHOOL
DEGAHWA, MOTIHARI
PRACTICE PAPER FOR CLASS: VII
SUBJECT: GEOGRAPHY

Lession: 8
THE EARTH'S STRUCTURE AND LAND FORMS

In this chapter, you will be able to learn
* Environment * Structure of the Earth * Rocks
* Development of Landforms

Environment: The earth is the only planet in the solar system that supports life. This is because conditions suitable for life are found only on the earth. However the conditions are not the same everywhere on the earth. It is hot at some places, while at others, it is cold." The physical and biological conditions in which an organism lives make up its environment." You know that the earth can be divided into three zones or sphere - the lithosphere (sphere of rock), the hydrosphere (sphere of water) and the atmosphere (sphere of air). Life exist only in some parts of these spheres. The parts of different sphere in which life exists together form the biosphere.

Structure of the Earth: We know that the earth consists of three concentric layers - the crust, the mantle and the core.

Rocks: Rocks may be of three types - igneous, sedimentary and metamorphic

Development of Landforms: We will study some processes that create or modify landforms

- Volcanoes - A volcano is a vent, or an opening, at a weak spot in the earth's crust through which magma erupts onto the surface as lava.
- Tectonic processes - The earth's lithosphere is broken up into several pieces, just like the pieces of large jigsaw puzzle. These pieces, known as plates.
- Earthquakes - An earthquake is a sudden and violent shaking of the earth's surface. The point at some depth below the earth's surface where the vibrations of an earthquake begin is called **focus**. The point on the earth's surface that lies directly above the focus is called epicentre. The instrument used for recording and measuring the vibrations of an earthquake is called a **seismograph**.

Find out:

a. What is environment ?
b. Name the layers of the earth.
c. What is biosphere ?
d. How many kinds of rocks are there ?
e What are tectonic plates ?
f. What is focus ?
g. What is epicentre ?
h. Name the instrument use to measure the intensity of earthquake.
i. What is a Volcano ?

EMMANUEL SCHOOL
BELBAHWA, MOTIHARI
PRACTICE PAPER FOR CLASS: VIII
SUBJECT: CIVICS

LESSION: 1

THE CONSTITUTION AND THE NEED FOR LAWS

In this chapter, you will be able to learn
* Constitution * Need for Laws * Legitimacy of Laws * Law and Dissent * The salt Satyagraha of 1930 * Anti-liquor Campaign * Rule of Law

Constitution: The constitution of a country is the fundamental law of the Land. A constitution binds diverse people together by creating some basic laws for them which are equal for everyone. This brings about harmony. All laws must be in accordance with the laid down principles in the constitution. Our Constitution was drafted by the Constituent Assembly. The Indian Constitution came into effect on 26 January 1950. "The constituent Assembly, India took two years, 11 months and 17 days to draft the constitution."

Need for Laws: India is a democratic country. In a large country like India, people think differently, the aspirations and needs are different and they follow varied culture. All this is enough to give rise to conflicts among them. To maintain the order in the Society and to ensure the welfare of the people, laws are needed. The constitution establishes the rule of law in the country. This means that no one is above the Law. Anybody who breaks the law will be punished accordingly.

Legitimacy of Law: As you know, the constitution is the ultimate source of laws. Only the constitution can give validity or legitimacy to the laws. If we look around our society, we will find that there are many people who suffer due to unjust social practice like caste system or untouchability. Indian government has passed several laws to ensure social, economic and political justice, equality of status and opportunities to achieve this purpose.

Laws and Dissent: When a law made by the government is against the interest of the people, the people protect the Law by showing their dissent. This has happened quite often when India was under British rule. This still happens sometimes even after India has gained independence. Dissent can be of two types:
* Constructive Dissent * Destructive dissent.

The Salt Satyagraha of 1930: The British imposed salt tax according to which the manufacture and sale of salt became British monopoly, the individual was allowed to make salt. Gandhiji launched salt Satyagraha against this tax. On 12 March 1930 Gandhiji along with his followers left the Sabarmati Ashram and walked to Dandi on 6 April 1930.

Anti-Liquor Campaign: Drinking liquor is social evil that has resulted in ruining many lives. Poor people waste their hard earned money on drinking liquor which is bad for their health. Mahatma Gandhi tried to end this shameful habit. Prohibition of liquor is included in Directive principles of state policy in part IV of our constitution.

Rule of Law: Our Constitution provides the framework of administering the country. A law which is against the fundamental rights of the people can be declared null and void by the supreme court. Thus, the Rule of Law will always prevail. The rule of law implies that no one is above the Law.

Find out:
i. What is a constitution? ii. Why do we need laws? iii. How much time did the Constituent Assembly take to draft the constitution? iv. Where did the Dandi March end? v. What are laws and dissent? vi. What do you mean by salt satyagraha? vii. What do you mean Anti-Liquor campaign?

Sunil Kumar
Civil Teacher
Emmanuel school

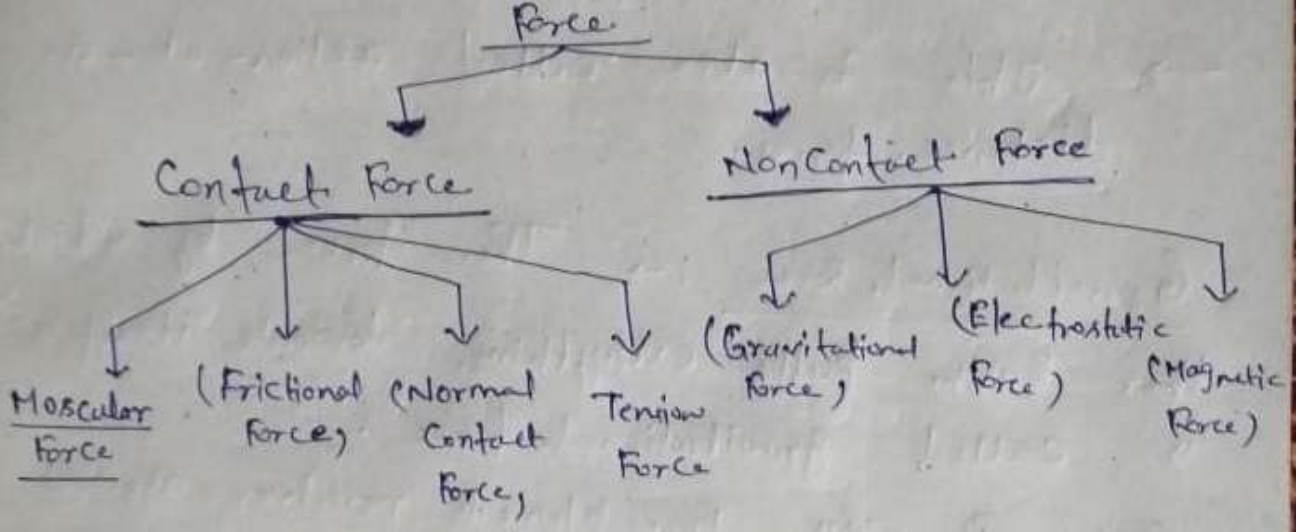
PHYSICS

Date:- 21/04/20

Class-8 (Ch-10) (Ravi Bhushan Sir) by

Force and Pressure

Types of Force



Contact Force :→ The force act between two object by mutual interaction called Contact force.

Ex→ Pushing a pram, Stretching a rubber band or kicking a Football.

(a) Muscular Force :→ The force applied by the parts of the human body for Example, arms and legs is called. Muscular force.

(b) Frictional Force :→ Such type of force which opposes the relative motion between two object called Frictional Force.

Non-Contact force :→ When two bodies are not in physical contact with each other, then force applied is called non-contact force.

→ This is also called action-at-a-distance forces.

Gravitational Force :→ The force by which the Earth pulls everything towards itself is called gravitational force.

Ex :→ (i) All the planets revolve around the sun.

(ii) Revolution of Satellites around Earth.

Magnetic Force :→ The force exerted between a magnet and a substance is called Magnetic force.

Electrostatic force :→ The attraction and repulsion force act between two charge particles called Electrostatic force.

Checkpoint -2

State whether the following statement are True or False

(1) Gravitational force is a type of Contact force.

(2) Iron nails get attracted to a magnet due to magnetic force.

(3) Horse can pull Carrioges due to Muscular force

(4) Apple falls from the trees due to Electrostatic force

(5) Frictional force is a type of non-contact force

Short question

(1) 

Find Resultant force and Direction of Motion of object.

(2) Explain type of Contact force ?

(3) Write differences between Contact and Non Contact Force.

(4) Describe Different type of Non Contact force

A. Define the following:
   a) Agriculture
   b) Horticulture
   c) Broadcasting
   d) Weeds
   e) Organic gardening
   f) Hybridisation
   g) Nitrogen cycle
   h) Apiculture
   i) Nitrogen Assimilation
   j) Pisci-culture
   k) Dentrification

B. Differentiate Between:
   a) Ammonification and Nitrification
   b) Sprinkler and Drip irrigation
   c) Crop rotation & Multiple cropping
   d) Rabi and Kharif Crops
   e) Manures and Fertilizers

C. Answer the following questions:
   a) How can we improve the production of crops
   b) Why are pea plants sown in a field after a crop of wheat is harvested?
   c) What are the advantages of ploughing the soil before sowing seeds in it?