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Math

### Number and place value

**Place value**, in mathematics, describes the value of every digit in a number depending on its position. These positions start from the units place (ones place). The order of the place value of digits in a number from right to left is expressed as ones/units, tens, hundreds, thousands, ten thousands, and so on. A number might have two similar digits but different values, which is decided by the position that the digit holds in the number. For example, the place value of 5 in 3458 is 5 tens, or 50. However, the place value of 5 in 5781 is expressed as 5 thousands or 5,000. It is important to understand that a digit can be the same, but its value depends on its position in the number.

**Example:** Write down the place value of each digit in the number 543.

The correct place value of each digit in the number can be expressed as follows:

* 5 × 100 = 500 or 5 hundreds
* 4 × 10 = 40 or 4 tens
* 3 × 1 = 3 or 3 ones

## **Addition and subtraction**

**Addition and subtraction** are the two primary arithmetic operations where we learn to add and subtract two or more numbers or any mathematical values. The other two basic math operations are multiplication and division. The symbol to represent addition is ‘+’ (plus sign) and subtraction is ‘-’ (minus sign).  Both addition and subtraction are inverse operations of each other.

 For example, if 9 + 1 = 10, then 10 – 1 = 9. That shows if 1 is added to 9 then the result is 10, whereas if 1 is subtracted from 10, then the result is 9.

### Addition

Addition means summing up two or more numbers or values to get another number.

For example, if we add 2 and 3, we get 5 as the result. (2 + 3 = 5 )

The property of addition is to increase the value by adding another value to it.

### Subtraction

Subtraction means reducing a value from another value to get the required value.

For example, subtracting 3 from 5 gives 2 as the answer.( 5 - 3 = 2 )

## Multiplication and Division

In Mathematics, multiplication and division are the two important arithmetic operations.  Both the multiplication and division operations are closely related to each other just like addition and subtraction. All these operations are performed on all real numbers.

* 2 multiplied by 3 is 6
* 6 divided by 3 is 2

### Multiplication

Multiplication is the repeated addition of a number. If we multiply m by n, that means m is repeatedly added to itself for n times. The symbol for multiplication is ‘×’.

For example, 8 multiplied by 4 is equal to 32. How? Adding 8, 4 times to itself,  we get;

8 + 8 + 8 + 8 = 32

Therefore, we can write,

8 x 4 = 32

### Division

The division is a method of dividing or distributing a number into equal parts.

For example, if 16 is divided by 4, then 16 is divided into 4 equal parts. Therefore, the resultant value is 4.

16 ÷ 4 = 4

### **Parts of division**

**Dividend ÷ Divisor = Quotient**

15 ÷ 3 = 5

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## Fractions, decimals and percentage

### Fractions

Fraction is defined as a part of the whole thing and is also termed as a portion or section of any quantity. Fraction is written as Numerator / Denominator.

The number on the top is called the numerator, and the number on the bottom is called the denominator. Total selected equal parts from a unit or group represent the numerator. Total equal parts of a unit (whole) or group represent the denominator.

In ½, 1 is the numerator, and 2 is the denominator.

### Decimals

A decimal is a fraction with denominator 10, 100 or multiples of 10.

A point used or written before any number to represent its tenth or hundredth is called a decimal representation.

In decimals,

1/10 = 0.1

1/100 = 0.01

1/1000 = 0.001

### Percentage

n mathematics, a **percentage** is a number or ratio that can be expressed as a fraction of 100. If we have to calculate percent of a number,  divide the number by the whole and multiply by 100. Hence, the **percentage means,** a part per hundred. The word per cent means **per 100**. It is represented by the symbol **“%”**.

Examples of percentages are:

* 10% is equal to 1/10 fraction
* 20% is equivalent to ⅕ fraction
* 25% is equivalent to ¼ fraction
* 50% is equivalent to ½ fraction
* 75% is equivalent to ¾ fraction
* 90% is equivalent to 9/10 fraction

Percentages have no dimension. Hence it is called a dimensionless number. If we say, 50% of a number, then it means 50 per cent of its whole.

Percentages can also be represented in decimal or fraction form, such as 0.6%, 0.25%, etc.

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## Measurement

We measure many things daily. We use different units, like millimetres, decimetres, centimetres, metres, feet, inches, yards and kilometres, to measure length, height, width, distance, etc.

In this chapter, let us learn about the different units of measurement.**Types of Measurement**

* We use a scale for the measurement of length.
* The length between 0 and 100 on a centimetre scale is 1 metre.
* Temperature is measured in degrees Celsius and degrees Fahrenheit.
* The average temperature of our body is 34°C celsius or 98.6° Fahrenheit.
* We use millilitre, litre, and kilolitre for measuring liquids such as milk, oil, and kerosine.
* For measuring the weight of solid objects, we use kilogram, gram, quintal, tons, etc.
* We use standard measurements such as millilitre, deciliter, metre, decimetre, centimetre, kilometre, etc.

### **Units of Length**

* 10 millimeter (m) = 1 centimetre(cm)
* 100 centimetre (cm) = 1 metre(m)
* 1000 centimetre (cm) = 1 kilometre(km)
* 10 centimetre (cm) = 1 decimetre
* 10 decimetre(dm) = 1 metre(m)
* 10 metre (m) = 1 decametre (dam)
* 10 decametre (dam) = 1 hectometre (hm)
* 10 hectometre (hm) = 1 kilometre (km)

### **Units of Weight**

* 10 milligram (mg) = 1 centigram (cg)
* 10 centigram (cg) = 1 decigram (dg)
* 10 decigram (dg) = 1 gram (gm)
* 10 gram (gm) = 1 decagram (dag)
* 10 decagram (dag) = 1 hectogram (hg)
* 10 hectogram (hg) = 1 kilogram (kg)
* 1 gram (gm) = 1000 milligram(mg)
* 1 kilogram (kg) = 1000 gram (gm)
* 100 kilogram (kg) = 1quintal
* 10 quintal = 1 ton

### **Units of Capacity**

* 1 litre (l) = 1000 millilitre (ml)
* ½ litre (l) = 500 millilitre (ml)
* 10 litre(l) = 1 daca litre (dal)
* 10 deciliter (dl) = 1 litre (l)
* 100 centilitre (cl) = 1 litre (l)
* 1000 millilitre (ml) = 1 litre (l)
* 500 millilitre (ml) = 1/2litre (l)
* 100 litre (l) = 1 hectolitre (hl)
* 1000 litre (l) = 1 kilo litre (kl)
* 10 daca litre (dal) = 1 hectolitre (hl)

### **Units of Time**

* One minute = 60 second
* One hour = 60 minutes
* One day = 24 hours
* One week = 7 days
* One month = 30 or 31 days
* One year = 12 months = 365 or 366 days in a leap year
* One decade = 10 years
* One century = 100 years
* One Millenium = 100 years
* February month has 28 or 29 days
* Leap year comes every four years

## Statistics

**Statistics** is the study of the collection, analysis, interpretation, presentation, and organization of data. In other words, it is a mathematical discipline to collect, summarize data. Also, we can say that statistics is a branch of applied mathematics. However, there are two important and basic ideas involved in statistics; they are uncertainty and variation. The uncertainty and variation in different fields can be determined only through statistical analysis. These uncertainties are basically determined by the probablilty that plays an important role in statistics.

Some of the real-life examples of statistics are:

* To find the mean of the marks obtained by each student in the class whose strength is 50. The average value here is the statistics of the marks obtained.
* Suppose you need to find how many members are employed in a city. Since the city is populated with 15 lakh people, hence we will take a survey here for 1000 people (sample). Based on that, we will create the data, which is the statistic.

## Ratio and proportion

**Ratio and Proportion** are explained majorly based on fractions. When a fraction is represented in the form of a:b, then it is a ratio whereas a proportion states that two ratios are equal. Here, a and b are any two integers. The ratio and proportion are the two important concepts, and it is the foundation to understand the various concepts in mathematics as well as in science.

In our daily life, we use the concept of ratio and proportion such as in business while dealing with money or while cooking any dish, etc. Sometimes, students get confused with the concept of ratio and proportion. In this article, the students get a clear vision of these two concepts with more solved examples and problems.

For example, ⅘ is a ratio and the proportion statement is 20/25 = ⅘. If we solve this proportional statement, we get:

20/25 = ⅘

20 x 5 = 25 x 4

100 = 100

Therefore, the ratio defines the relationship between two quantities such as a:b, where b is not equal to 0. Example: The ratio of 2 to 4 is represented as 2:4 = 1:2.

Science

States of matter

The matter is made up of very tiny particles and these particles are so small that we cannot see them with naked eyes. It has been observed that matter exists in nature in different forms. Some substances are rigid and have a fixed shape like wood and stone; some substances can flow and take the shape of their container like water, while there are forms of matter that do not have definite shape or size such as air.

Following are the basic 3 states of matter

* **Solid**
* **Liquid**
* **Gas**

## **Solid Definition**

* In solids, particles are tightly or closely packed.
* The gaps between the particles are tiny and hence it is tough to compress them.
* Solid has a fixed shape and volume.
* Due to its rigid nature, particles in solid can only vibrate about their mean position and cannot move.
* Force of attraction between particles is adamant.
* The rate of diffusion in solids is very low.
* An example of solids: solid ice, sugar, rock, wood, etc.

## **Liquid Definition**

* In a liquid state of matter, particles are less tightly packed as compared to solids.
* Liquids take the shape of the container in which they are kept.
* Liquids are difficult to compress as particles have less space between them to move.
* Liquids have fixed volume but no fixed shape.
* The rate of diffusion in liquids is higher than that of solids.
* Force of attraction between the particles is weaker than solids.
* Example of a liquid state of matter: water, milk, blood, coffee, etc.

## **Gas Definition**

* In gases, particles are far apart from each other.
* Force of attraction between the particles is negligible, and they can move freely.
* Gases have neither a fixed volume nor a fixed shape.
* The gaseous state has the highest compressibility as compared to solids and liquids.
* The rate is diffusion is higher than solids and liquids.
* The kinetic energy of particles is higher than in solids and liquids.
* An example of gases: air, helium, nitrogen, oxygen, carbon dioxide, etc.

## Metal and non-metal

**Metals:**

* High to moderately electropositive so electrons are generally free moving.
* Good conductors of heat and electricity.

**Non-metals:**

* Moderately to highly electronegative so no free electrons.
* Bad conductors of heat and electricity.

|  |  |
| --- | --- |
| **Metals** | **Non- metals** |
| Metals react with oxygen to form basic oxides. | Non-metals react with oxygen to form acidic oxides. |
| Most of them displace hydrogen from dilute acids. | Non-metals are non-reactive with dilute acids. |
| Only few of the metals combine with hydrogen to form ionic hydrides. | Non-metals combine with hydrogen to form covalent hydrides. |
| Most metals displaces hydrogen from water/water vapours to form metal hydroxide. | Usually, they do not react with water/ water vapours. |
| Metals react with chlorine to form ionic chlorides | Non-metals react with chlorine to form covalent compounds. |
| Metals are electropositive. | Non-metals are electronegative. |

## Earth Science

Earth science is a broad spectrum of science, that covers life science and physical science. Life science is all about the study of living organisms and their relationships including biology, anatomy, ecology, etc. It is the study of the earth and its neighbouring celestial bodies of the solar system.

In a simple manner, the branches of science dealing with the physical constituents of earth and the atmosphere is considered to be the definition of earth science.

This subject includes all physical processes that occur on the earth’s surface as well as in its atmosphere. Therefore, earth science involves the entire natural phenomenon like rainfall, storms, hurricanes, drought, floods, etc. Also, the factors that affect these physical processes and the effect of these natural processes on earth and the living organisms are studied under the head.

### **Earth Science Formulas**

* The earth’s magnetic field:

|  |
| --- |
| B, Bv, BH |

Where,

* B is the Earth’s magnetic field
* B*v* is the magnetic field in the vertical component
* B*H* is the magnetic field in the horizontal component

## Energy

Energy is a backbone of complete production activity. Any production activity cannot operate without energy as it an important aspect of a development process. Not only in the industrial sector but also in agriculture sector, energy is used on a large scale. This energy is used in operations like transportation and operations of pesticides, fertilisers, and farm equipment. It also plays an important part in households for household lighting, cooking, and heating.

## **Sources of Energy**

* **Commercial Energy-** This type of energy is usually consumed by commercial entities and not by the residential or households. This energy is accessible to the consumers at a price to be paid and is a non-renewable source of energy. Commercial sources like coal, petroleum, and electricity are bought and sold it to the users. Sometimes the use of a commercial source of energy is taken as a sign of economic development of a country.
* **Non- Commercial Energy-** This sources of energy is used by people for household purpose. It indicates the standard of living of a country. Non-commercial energy is available free of cost to the users. Few examples are cow dung, firewood, and agriculture waste.

## **Conventional & Non-Conventional Source of Energy**

* **Conventional Source of Energy-** This source of energy is natural energy resources, that has been used for many years to produce light, heat, food, and electricity. The energy is further divided into Commercial and Non-commercial sources of energy. This energy is non-renewable and is available in limited quantity apart from hydro-electric power. Few types of conventional energy are Coal, natural gas, electricity, thermal power, cow-dung, straw, etc.
* **Non-Conventional Source of Energy-** This source of energy is available in abundance in nature as it doesn’t get exhausted easily and are renewable. It is economical, eco-friendly and used for domestic purposes. Few types of non- conventional energy are wind, sun, biological waste, etc to produce power and heat.

## Solar System

Our solar system includes Sun, planets, satellites, dwarf planets, asteroids, comets, etc. Let us briefly discuss the important members of the solar system. The solar system is huge, at least 100 astronomical units in size (15 trillion km).

The sun is the biggest object in the solar system and provides energy to the earth by nuclear reactions that occur in its centre. The sun is a star and has a surface temperature of 6000 ⁰C. It is mostly composed of Hydrogen gas along with a small amount of Helium gas.

## **What does the Solar System consist of?**

The solar system also contains 8 **planets** which are large almost spherical objects that revolve around the sun in elliptical paths known as orbits. The earth is also one of the planets and lies at a distance from the sun such that it is neither too hot nor too cold for life to exist. The planets were formed at least 4.6 billion years ago when discs of dust and gas orbiting around the sun collapsed and clumped together due to gravity. There are two kinds of planets:

1. Rocky planets include Mercury, Venus, Earth, and Mars which are mostly made up of solid rock and metal.
2. Gas giants include Jupiter, Saturn, Uranus, and Neptune which are mostly made up of gases like Hydrogen, Helium, Methane, etc. These planets are very large in comparison to the rocky planets.

The solar system also contains small irregularly shaped objects made of rock, metal, and carbon called **asteroids** orbiting the sun. Most of these objects lie between the orbits of Mars and Jupiter in the asteroid belt.

## **Asteroids**

These are big chunks of rock or metal that are mostly found orbiting the Sun between Mars and Jupiter. It is believed that these moons did not originally orbit Mars, but were instead a part of the Asteroid belt. The asteroid belt lies between Mars and Jupiter. It contains lumps of rock much smaller than planets. These lumps are called asteroids or minor planets. They are not visible from Earth with the naked eye, but many may be seen through binoculars or small telescopes.

## **Satellites**

Satellites are objects that revolve around planets and are also part of the solar system. The Earth’s natural satellite is the Moon. Some satellites like Ganymede (orbiting Jupiter) are bigger than Mercury and can have atmospheres.

**Artificial satellites** are an important part of the solar system too, these satellites are man-made. These satellites revolve around the earth much closer than the Earth’s natural satellite, the moon. Aryabhata is the first artificial satellite of India. Many other satellites have been launched by India. Some of them are INSAT, IRS, and EDUSAT.

## **Comets**

Comets are small irregularly shaped objects made up of ice. They usually come from the outermost reaches of the solar system beyond Neptune from a region known as the Kuiper Belt. When these objects come close to the sun, the ice vaporizes forming a beautiful tail behind them. Some of these comets appear regularly such as the Halley’s Comet which appears once every 76 years (the next time in year 2061!).

## **Dwarf Planets**

Dwarf planets are objects smaller than planets and larger than asteroids that orbit the sun at various places. The nearest dwarf planet to us is Ceres which lies in the asteroid belt. The most famous is Pluto which lies beyond Neptune on the inner edge of the Kuiper belt. In 2014, Pluto and its 5 satellites were visited by a spacecraft named New Horizons for the first time in history capturing images of the icy dwarf planet in high resolution.

### Planets

We have 8 planets in our solar system. They are Mercury, Venus, Earth, Mars, Saturn, Jupiter, Uranus and Neptune.

## Cell Structure and Function

Cell forms the structural, functional and biological units of living entities. These building blocks have the capability to replicate themselves. Cells vary distinctly in their structure and function. Entities can be unicellular or multicellular.

**Cell:**

1. The structural and functional unit of life is a cell.
2. They are the lowest levels of organizations found in any form of life.
3. Cells are composite and their constituents carry different life processes.

**Cell structure:**

1. A cell comprises several constituents, which perform unique activities that carry out different processes of life.
2. These constituents are cell wall, cytoplasm, cell membrane, cell organelles, and nucleus.

**Functions:**

1. A cell performs various activities, which are important for the development and growth of an organism. Some of the essential functions of a cell are as follows:
2. It facilitates growth during mitosis.
3. It provides structure and support.
4. It helps in the generation of energy.
5. It permits the transport of different substances.
6. It helps in the process of reproduction.

## Type of fluid flow

Types of Fluid Flow refer to the various classifications and characteristics that define the behavior and movement of fluids. Fluids, which can include liquids and gases, exhibit different flow patterns depending on factors such as velocity, pressure, and viscosity. Understanding the Types of Fluid Flow is crucial in numerous scientific and engineering applications, as it helps predict and analyze fluid behavior in various systems.

The study of Types of Fluid Flow encompasses a wide range of phenomena, each with its own unique properties and implications. Laminar flow is one common type, characterized by smooth, streamlined motion where the fluid particles move in parallel layers without mixing. In contrast, turbulent flow is another significant type, featuring chaotic and irregular movement, with eddies and swirls forming throughout the fluid. Transitional flow exists between these two extremes, displaying a combination of both laminar and turbulent characteristics. There are several types of fluid flow, each characterized by distinct patterns and behaviors. Here are some of the main types:

## **Laminar Flow**

Laminar flow is a smooth and orderly type of fluid flow characterized by parallel layers of fluid particles moving without significant mixing. In laminar flow, the particles move in a predictable manner, following well-defined streamlines. It occurs at low velocities, high viscosities, and in the absence of obstructions, creating an organized and predictable flow pattern.

## **Turbulent Flow**

Turbulent Flow is a dynamic and chaotic type of fluid flow characterized by irregular motion and the formation of eddies, vortices, and fluctuations in velocity and pressure. It occurs at high velocities, low viscosity, and in the presence of disturbances or obstacles, playing a significant role in many natural and engineered systems.

## **Transitional Flow**

Transitional flow is a type of fluid flow that occurs between laminar and turbulent flow regimes. It exhibits a mixture of laminar and turbulent characteristics, with the flow pattern oscillating between the two states. Transitional flow is influenced by factors such as flow velocity, fluid viscosity, and pipe roughness, making it a transitional phase in fluid behavior analysis.

## **Steady Flow**

Steady flow refers to a condition in fluid dynamics where the properties of the flowing fluid, such as velocity, pressure, and temperature, remain constant at any given point within the flow field over time. It implies a consistent and unchanging flow rate, allowing for simplified analysis and prediction of fluid behavior in a wide range of engineering and scientific applications.

## **Unsteady Flow**

Unsteady flow, also known as transient flow, refers to fluid motion where the properties, such as velocity, pressure, and temperature, vary with time at different points in the flow field. It occurs during start-up or shutdown processes, sudden changes in flow conditions, or any situation where fluid properties change dynamically, highlighting the time-dependent nature of the flow behavior.

## **Compressible Flow**

Compressible Flow refers to the movement of fluids, typically gases, where changes in density and pressure significantly impact the flow behavior. In compressible flow, the fluid’s compressibility plays a vital role, resulting in variations in density, velocity, and pressure throughout the flow field. Understanding compressible flow is crucial in fields such as aerodynamics, rocket propulsion, and gas dynamics.

## **Incompressible Flow**

Incompressible Flow refers to the behavior of fluids, typically liquids, where the density remains constant regardless of changes in pressure. This type of flow is commonly assumed in low-speed and low-pressure systems, where the volume of the fluid remains constant, allowing for simplified analysis and calculations of fluid behavior and flow patterns.

## **Viscous Flow**

Viscous flow refers to the movement of fluid particles experiencing internal friction, resulting in resistance to flow. It occurs in fluids with non-negligible viscosity, such as liquids and some gases. Viscous flow can exhibit different characteristics, ranging from smooth and ordered in laminar flow to chaotic and irregular in turbulent flow, and it plays a crucial role in various scientific and engineering applications.

## **Irrotational Flow**

Irrotational flow is a type of fluid motion where fluid particles do not rotate as they move. It is characterized by the conservation of angular momentum and is often observed in idealized fluid systems. Irrotational flow has important applications in fields such as aerodynamics, hydrodynamics, and the study of potential flow.

## **Multiphase Flow**

Multiphase Flow refers to the simultaneous movement of two or more phases, such as gases, liquids, or solids, within a system. This complex fluid behavior is encountered in numerous industries, including oil and gas production, chemical processing, and environmental engineering. Understanding and analyzing Multiphase Flow is crucial for optimizing processes, designing efficient systems, and ensuring the safe and reliable transportation of multiple phases within a single system.

English

## Grammar

## **Types of Moods in English Grammar with Examples**

Mood is divided into three main categories in English grammar, namely,

* Indicative mood
* Imperative mood
* Subjunctive mood

### **Indicative Mood**

The most commonly used mood in the English language, the indicative mood, expresses facts, opinions and general statements. It is used to say if something did or did not happen. Here are some examples of sentences expressing the indicative mood.

* Irene washed all the clothes yesterday.
* We will be going to Dubai next month.
* The temperature is 22°C in Bangalore.
* Tomorrow is a holiday.
* It is raining heavily.

### **Imperative Mood**

Sentences with verbs conveying commands, orders, and requests are said to be in the imperative mood. In other words, it can be said that all imperative sentences are in the imperative mood. The actions stated in the imperative mood are yet to happen, and there are chances that they might not happen at all. These sentences take the infinitive form of the verb and exclude the subject. However, you can use nouns or noun phrases as a noun of address to specify who/whom the request, order or command is directed.

Look at the following examples.

* Pick up the dress on your way.
* Switch on the lights; it is getting dark.
* Anu, can you please help me with this?
* Stop when you see the red light.
* Shaun, close the door.

### **Subjunctive Mood**

The subjunctive mood does not speak about objective facts. It includes opinions, intentions, beliefs and desires; in general, it portrays an individual’s state of mind. It is also used to present hypothetical situations.

Here are a few examples to help you understand.

* The manager insisted that we attend the workshop on SEO writing and optimisation.
* I wish I could have ice cream now.
* If you were me, what would you have done?
* I believe that it will get better.
* The doctor recommended that I take complete rest for two days.

Interrogative mood and conditional mood are also learnt in addition to these most often. Let us look at each of these in detail.

### **Interrogative Mood**

The interrogative mood is expressed through interrogative sentences. It indicates that it is a question with the motive of deriving an answer.

* Are you planning to take up the course on resin art?
* What are your plans for the weekend?
* When are you coming back to Coimbatore?
* Is this Priya’s new car?
* Did you find the answer to that differential equation?

### **Conditional Mood**

The conditional mood indicates the conditions under which a particular course of action might or might not take place. Subordinating conjunctions such as ‘if’ and ‘when’ and modal verbs such as ‘would’, ‘might’ and ‘could’ can be used to frame sentences in the conditional mood.

Given below are some examples of sentences in the conditional mood.

* You will reach on time if you leave home by 7 a.m.
* We will meet you when we come to Bangalore the next time.
* They will make an exception if you have genuine reasons.
* You could enrol if you are interested in learning about cultural diversity.
* Windy can make you another drink if you’d like.

## Verbs

## **Verbs in English Grammar**

In the English Language or any language for that matter, verbs happen to be an essential part of speech, without which it would be impossible to indicate what the subject is doing. It refers to all actions, including those related to feelings and emotions. Verbs come in different types and forms so that they can perform differently in order to provide complete meaning. Before we look into the types of verbs and the verb forms, let us look at how various dictionaries define the term ‘verb’.

### **Definition of a Verb**

The Oxford Learners’ Dictionary defines a ‘verb’ as “a word or group of words that express an action (such as *eat*), an event (such as *happen*) or a state (such as *exist*)”. According to the Cambridge Dictionary, a ‘verb’ is defined as “a word or phrase that describes an action, condition, or experience”. The Collins Dictionary provides a much more elaborate definition of a verb. According to them, “A verb is a word such as ‘ sing’, ‘ feel’, or ‘ die’ which is used with a subject to say what someone or something does or what happens to them, or to give information about them”.

## **General Classification of Verbs according to What They Signify**

Before we get into a broad classification, let us first have a look at how verbs can be classified generally according to what kind of action they signify.

### **Verbs Referring to Actions**

Verbs referring to action (action verbs) are those that involve the movement of one’s body in one way or the other. Some examples of verbs referring to actions are as follows:

* Walk
* Run
* Talk
* Sit
* Read
* Write
* Jog
* Cough
* Sleep
* Jump
* Sing
* Drink
* Teach
* Present
* Build
* Break
* Tow
* Toss
* Hug
* Fight

### **Verbs Referring to Experiences or Feelings**

These are verbs that refer to something that you can feel or experience and do not necessarily involve a movement of any kind. Some examples of verbs referring to feelings and experiences are as follows:

* Love
* Hate
* Envy
* Believe
* Trust
* Feel
* Entrust
* Experience
* Care
* Cherish
* Sense
* Know
* Recognise
* Understand
* Comprehend
* Like
* Need
* Adore
* Loathe
* Appreciate

### **Verbs Referring to a State or Condition**

These verbs are those that refer to situations or the state of being. All forms of ‘to be’ verbs belong to this category. Some examples of verbs referring to a state or condition are as follows:

* Am
* Is
* Are
* Was
* Were
* Have
* Has
* Will be
* Appear
* Seem
* Become
* Been
* Being

## **The Various Types of Verbs with Examples**

Verbs can be classified into numerous types according to their function or role in a sentence or context. Let us look into the various types of verbs and some examples of each type of verb.

### **Auxiliary Verbs/Helping Verbs**

Auxiliary verbs or helping verbs, as the name suggests, is a verb that is used to help another verb sound sensible and meaningful. It is used to change the other verb’s tense, mood or voice. So, every time an auxiliary verb is used, you always have one more verb, which acts as the main verb in a sentence.

Examples of auxiliary verbs are as follows:

* Am
* Is
* Are
* Was
* Were
* Have
* Has
* Do
* Will
* Can

One point you have to take care of when you use auxiliary verbs is that you should conjugate the auxiliary verb correctly according to the tense form of a sentence. Another specific fact about auxiliary verbs is that they can also be used as a main verb. Also, there are verbs called modal verbs that can be used as a helping verb.

### **Modal Verbs**

Modal verbs are those verbs that are used to denote the possibility, probability, capability or necessity of something happening. Modal verbs, unlike other auxiliary verbs, cannot be used as a main verb in a sentence.

Examples of modal verbs are as follows:

* Can
* Could
* Will
* Would
* May
* Might
* Should
* Must
* Ought to

### **Phrasal Verbs**

Phrasal verbs include phrases that are formed by combining two or more parts of speech that performs the same function as a verb in a sentence. In most cases, a phrasal verb results from a combination of a verb and a prepositions.

Some examples of phrasal verbs are as follows:

* Go by
* Lay off
* Log in
* Get off
* Run out
* Go all out
* Think through
* Fed up
* Taken aback
* Act on
* Back away
* Back up
* Look up
* Mix up
* Opt out
* Pop in

### **Linking Verbs**

A linking verbs, just like the name suggests, is a type of verb that is used to link the subjects in a sentence to the other parts of the sentence so that it is meaningful. It connects the subject to the object, an adjectives and even a prepotision pharse. All ‘to be’ forms of verbs and verbs like ‘seem’ and ‘become’ can act as linking verbs.

Have a look at the following examples to understand how verbs perform the role of a linking verb in sentences.

Example 1: Connecting Nouns to Other Nouns in a Sentence

Danny **is** my brother.

In the above example, the verb ‘is’ is used to connect the subject ‘Danny’ as the ‘brother’ of the speaker. In this sentence, the words ‘Danny’ and ‘brother’ are used to refer to the same person.

Example 2: Connecting a Noun to a Prepositional Phrase in a Sentence

The children **were** in the park.

In Example 2, the verb ‘were’ is used to connect the subject ‘the children’ to the prepositional phrase ‘in the park’.

Example 3: Connecting a Noun/Subject to an Adjective

Your presentation of the life cycle of the silkworm **was** excellent.

In the above example, the verb ‘was’ is used to link the subject ‘Your presentation of the life cycle of a silkworm’ to the adjective ‘excellent’.

Example 4: Connecting the Subject/Noun to the Predicate using Seem/Become

This book on a treasure hunt **seems** interesting.

In this sentence, the subject ‘This book on a treasure hunt’ is connected to the adjective ‘interesting’ with the linking verb ‘seem’.

The students **became** bored after two continuous hours of classes and were not ready to take another hour of class without a break in between.

In the above sentence, the subject ‘The students’ has been linked to the rest of the sentence with the linking verb ‘became’.

## **Different Categories of Verbs**

Verbs can be divided into different categories according to their behaviour when used in a context. Let us look at the categories explained below.

### **Regular Verbs and Irregular Verbs**

As you can see, verbs are used to denote actions, and they can be used in different forms to indicate when the subject in a sentence is carrying out an action. A regular verb can be conjugated to show if the action takes place in the past or if the action is taking place continuously.

In most cases, the past form of the verb is formed by adding an ‘ed’ to the root verb for regular verbs. On the other hand, there are other verbs that do not follow this rule. They are called irregular verbs. These verbs have their own unique forms. If you are wondering how to learn these irregular verbs, read the article on irregular verbs to find out how.

Have a look at the examples given below.

* Dileep **searched** for his white shirt in his cupboard, but he did not find it. (Root verb – search)
* Did you find the book you were **looking** for?

In the above examples, the verb ‘searched’ is the past form of the regular verb ‘search’ by adding an ‘ed’ and the verb form ‘looking’ indicates the continuous form of the regular verb ‘look’ by adding an ‘ing’ to the end of the root verb.

* Selena **read** the book on the evolution of life on earth.
* Vineeth **found** the keys that went missing yesterday.

In the above examples, the verb ‘read’ stays the same in the past form and when used as a past participle. ‘Found’ is the past form of the root verb ‘find’.

### **Transitive Verbs and Intransitive Verbs**

**Transitive Verbs and Intransitive Verbs** are used to denote how a verb acts when used with a direct object and an indirect object. Let us look at a few examples.

* Vincent **gave** a box of chocolates to his brother. (Indirect object – his brother, Direct object – a box of chocolates)
* Garry **passed** the water bottle to Kevin, who was sitting in the first row. (Indirect object – Kevin, Direct object – the water bottle)
* The little girl **ran** around the park for two hours.
* Francey **walked** to school every day.
* My mom **cleaned** the house today. (Direct object – the house)
* Seena **did not like** the movie. (Direct object – the movie)

In the above examples, the verbs ‘gave’ and ‘passed’ in the first two sentences are seen to take a direct object and an indirect object, whereas the verbs ‘ran’ and ‘walked’ take no object at all. In the last two sentences, the verbs ‘cleaned’ and ‘did not like’ take a direct object and no indirect object.

Verbs that take a direct object alone are called **transitive verbs,** and those verbs that do not take either a direct object or an indirect object are called **intransitive verbs**. There is yet another category of verbs that take both the direct object and the indirect object, and they are called **ditransitive verbs**.

## **Verb Forms**

A verb is used in different ways to indicate the time in which the subject is performing an action. There are various verb forms that are used to do the same. Let us look at the different verb forms explained below.

### **Root Verb**

The raw or original form of the verb, how it originally exists in the English language, without any inflexions or conjugations, is called the root verb.

Some examples of root verbs are as follows:

* Eat
* Sit
* Stir
* Type
* Read
* Fry
* Tick
* Shift
* Trick
* Sing

### **Simple Present – Third Person Singular**

The third person singular form of the verb in the present tense is mostly the verb in the singular form. When using the third person singular pronouns such as he, she and it, and the nouns that can be substituted by the third person singular pronouns, the verb is singular (mostly done just by adding an ‘s’ to the root verb) so that it agrees with the subject in the sentence.

For example:

Kenny **likes** to have mangoes after every meal. (The noun ‘Kenny’ can be substituted with the third person singular pronoun ‘he’)

The cat **chases** every rat it **catches** sight of. (The noun ‘The cat’ can be substituted with the third person singular pronoun ‘it’)

She **hates** going to work on Saturdays and Mondays.

### **Present Participle**

The present participal is used in the continuous form of tenses to indicate an action that is continuing or in progress at that particular moment or sometime in the past or in the future. These words are formed just by adding an ‘ing’ to the root verb. For verbs ending with an ‘e’, in most cases, the present participle is formed by removing the ‘e’ and then adding ‘ing’ to the remaining portion of the verb.

For example:

Jhanvi is **watching** a movie along with her cousin. (Present Continuous Tense)

My mother is **baking** cakes (Present Continuous Tense)

All my brothers were **playing** dodgeball in the evening. (Past Continuous Tense)

### **Simple Past**

There is a change in the spelling of the root verb when it is used to indicate the simple past tense form of the verb. There is no one rule to write a verb in the simple past tense; it changes for each verb – some verbs like ‘give’ and ‘bring’ take a different spelling, and some verbs like ‘cut’ and ‘put’ remain the same when used in the past tense. However, most verbs can be made into the past tense by adding an ‘ed’ at the end of the root verb.

For example:

* The doctor **asked** me to take tablets for ten days. (The rook verb here is ‘ask’)
* Nelson **bought** the car he **checked** out last week. (The root verbs here are ‘buy’ and ‘check’)
* The baby **drank** the milk completely. (The root verb here is ‘drink’)

### **Past participle**

The past participle form of the verb is used to denote the perfect tense forms in a sentence. In some cases, the past tense and the past participle remain the same, but there are a number of verbs that have different spellings when used as a simple past tense verb and a past participle.

For example:

* I have **searched** the entire loft for that box, but I did not find it. (The root verb here is ‘search’, ‘have searched’ is the verb in the sentence that indicates the perfect tense and ‘searched’ is the past participle)
* Dylan had **read** the book already.

In the above example, the root verb here is ‘read’, ‘have read’ is the verb in the sentence that indicates the perfect tense and ‘read’ is the past participle. In this case, all forms of the verb take the same spelling but have a different pronunciation.

### **Gerunds**

Any verb can be transformed into a gerund by adding ‘ing’ to the root verb. Gerunds, when it stands by themselves, can be used as nouns. A gerund can be used as a verb when used with an auxiliary verb to indicate an action that is continuing at a particular period of time.

For example:

* He is **eating** an apple.
* Joy will be **coming** home next week.
* **Walking** every day is good exercise.
* **Drinking** and **driving** is dangerous.

### **Infinitives**

Infinitives, like gerunds, can be used to turn verbs into nouns by adding a preposition ‘to’ in front of the root verb.

For example:

* Would you like **to have** something?
* I like **to dance** in my free time.
* I am going **to talk** to my friend.

### Active voice and Passive voice

According to the position of the subject and object in a sentence, the voice of the verb can be determined. A sentence in which the subject does the action is called the active voice, and a sentence in which the indirect object or the direct object is switched to make it the subject is called the passive voice.

For example:

* Active Voice – The doctor checked the patient.
* Passive Voice – The patient was checked by the doctor.

## **Conjugating Verbs in the English Language – Tense Forms**

Verbs can be conjugated to denote the tense you need. There are four tense forms, namely the simple tense, the continuous tense, the perfect tense and the perfect continuous tense. These tense forms are used to represent three time periods such as the present, past and future, thereby forming twelve main tense forms in total.

You can learn more about tenses and how to conjugate them in detail by reading the article on tenses.

## **Points to Remember**

Here are some points for you to keep in mind when using verbs in your speech or writing.

* Always try to use an active voice in your speech and writing as it is preferred widely and conveys the message in a quick and simple manner. Do not use the passive voice unless it is absolutely necessary.
* When you conjugate verbs to indicate different tense forms, see to it that the subject and the verb agree with each other.
* Improve your vocabulary. Try to learn the specific verbs for every action instead of modifying other verbs to convey the same. For example, stroll means a leisurely walk, and jabber means to talk in a very excited, rapid and incomprehensible manner, yelp means a short and sharp cry to indicate pain or an alarm.

## Adjectives

## **What Is an Adjective?**

An adjective is a part of speech that can be used to describe or provide more information about a noun or pronoun that acts as the subject in a sentence. Adjectives are found after the verb or before the noun it modifies.

### **Definition of an Adjective**

According to the Cambridge Dictionary, an adjective is defined as “a word that describes a noun or pronoun.” The Collins Dictionary gives a more elaborate definition. According to it, “an adjective is a word such as ‘big’, ‘ dead’, or ‘ financial’ that describes a person or thing, or gives extra information about them. Adjectives usually come before nouns or after link verbs.”

* Positive or Absolute Form
* Comparative Form
* Superlative Form

### **Positive Degree of Comparison:**

The positive form or the **Positive Degree of Comparison:** is the form of the adjective used in the original form. For example: This book is **interesting.** This form of adjective is used when there is no other subject to be compared.

### **Comparative Degree of Comparison**

The **Comparative form** of the adjective is used when two subjects performing the same action or possessing the same quality are compared. For example: The book I read yesterday was **more interesting than** the one I read today.

### **Superlative Degree of Comparison**

The **Superlative Degree of Comparison** is used when comparing the same quality of two or more subjects and to represent that a subject is superior to two or more subjects in performing an action. For example: This fantasy novel is the **most interesting** book that I have ever read.

## **Types of Adjectives**

Adjectives can be divided into different categories based on their functions when used in a sentence. The different types of adjectives are:

* Possessive Adjectives
* Interrogative Adjectives
* Demonstrative Adjectives
* Compound Adjectives

### **Possessive Adjectives:**

These adjectives, like possessive, are used to show or represent possession of a quality. For example: my, your, his, her, their, its, whose, etc.

### **Interrogative Adjectives:**

An adjective that is used to modify a noun or a pronoun by asking a question is called an interrogative adjective. There are only a few adjectives that can be termed as interrogative adjectives. They are whose, what and which.

### **Demonstrative Adjectives:**

Demonstrative adjectives are mainly used to describe the position of a subject (a noun or pronoun) in space or time. This, that, these and those are the demonstrative adjectives in English.

### **Compound Adjectives:**

Compound adjectives consist of two or more adjectives that are combined together to form an adjective that can be used to modify the subject. Some examples of compound adjectives are cotton-tailed, curly-haired, absent-minded, happy-go-lucky, etc.

### **How to Use Adjectives in Sentences?**

Adjectives are known to give your writing and speech a very flowery look. It aids in making it descriptive and also in giving your readers and listeners a visual treat. However, stuffing it with too many adjectives can make it look or sound vague and unclear. This would only lead to misunderstanding of your content. Knowing when, where and how to use adjectives is a skill that you should master.

Any piece of writing should be clear and precise. Find out if there is a word that specifically means whatever you are trying to convey. For example: quick, swift, hasty, fleet, etc. are all adjectives that mean ‘very fast’. Likewise, contented, cheerful, merry, joyful, ecstatic, delighted, etc. are all words that describe different degrees of happiness. There is also another concept that you should know. There is a particular order in which you should place adjectives when you are using two or more adjectives to describe the same subject or object.

## **Examples of Adjectives**

If you are wondering what part of speech a colour or a number belongs to, do not waste any more time thinking about it. All colours and numbers are classified as adjectives. Adjectives are words that modify nouns but in most cases, they can be seen to be doing much more than that. Given below are the various ways in which adjectives can function and be used.

### **Adjectives as Complements**

Adjectives can act as complement that modify nouns that act as subjects and objects. When the adjective describes the object in a sentence, it is called an object complement and when it is used to describe the subject in a sentence, it is referred to as a subject complement. They are seen to be used in sentences which are seen to use the following patterns:

* SVC – Aaron is good.

In the above example, the adjective is ‘good’ and it is used to describe the subject ‘Aaron’ and so it is called a subject complement.

* SVOC – The movie made Karthik sleepy.

Here, the adjective ‘sleepy’ describes the object ‘Karthik’ and so comes under the category of object complements.

### **Adjectives as Coordinates**

When two or more adjectives are used to describe the same noun in a sentence, they are called coordinate adjectives. Coordinate adjectives are often separated by a comma or the conjunction ‘and’.

For example:

* The mobile phone is **easy to use** and **handy.**
* My cousin is **tall** and **thin.**

### **Multifunctional Adjectives**

Adjectives can be made to function like or take the role of nouns in a sentence, and sometimes, a noun, when used to describe or provide more information about another noun, can perform the role of an adjective.

For example:

* I like my English teacher.

In the above example, the word ‘English’ is generally considered a noun as it represents a language and it is a proper noun. But here, it is used to describe the noun ‘teacher’ which makes it an adjective.

* It is our duty to tend to the poor and the oppressed.

In this sentence, the words ‘the poor’ and ‘the oppressed’ pass off as nouns as it refers to ‘poor people’ and ‘oppressed people’. So, when adjectives are preceded by the article ‘the’, it often refers to a category of people which makes the adjective a noun.

## Adverb

## **What Is an Adverb?**

Like an adjective gives us more information about the noun in a sentence, an adverb is used to provide more information about the verb or the action in the sentence. It also has the property of describing the adjective or another adverb.

### **Definition of an Adverb**

An adverb, according to the Oxford Learner’s Dictionary, is “a word that adds more information about place, time, manner, cause or degree to a verb, an adjective, a phrase or another adverb.” The Cambridge Dictionary defines an adverb as “a word that describes or gives more information about a verb, adjective, adverb, or phrase.”

The Merriam-Webster Dictionary provides a similar definition. It defines an adverb as “a word used to modify a verb, an adjective, or another adverb and often used to show degree, manner, place, or time.” According to the Collins Dictionary, an adverb is defined as “a word such as ‘slowly’, ‘ now’, ‘very’, ‘politically’, or ‘ fortunately’ which adds information about the action, event, or situation mentioned in a clause.”

## **Types of Adverbs**

Adverbs are categorised into different types according to their functions when used in a sentence. Given below are the different types of adverbs.

* Adverbs of Manners
* Adverbs of Time
* Adverbs of Place
* Adverbs of Frequency
* Adverbs of Degree
* Conjunctive Adverbs

## **Examples of Adverbs**

Now that you know what adverbs are and how there are different types of adverbs, let us look at some adverbs example to see how they can be used effectively in sentences.

### **How Adverbs are Used in Sentences**

Unlike other parts of speech, adverbs can be placed at any part of the sentence (beginning, middle or end), and make complete sense without sounding absurd. Another characteristic is that multiple adverbs can be used in a sentence. Have a look at the following examples to have a clear understanding of the same.

* I was planning to go to the supermarket to buy some groceries. **However**, I did not find the time to go. So I ordered online.
* My mom did not cook breakfast today. **Therefore**, we ended up making noodles for everyone.
* **Normally**, we go to church on Sundays.
* Don’t you think the coffee is **too** sweet?
* Do not worry. You will **gradually** learn how to do it.
* The song I was listening to **yesterday** was **very** soothing.
* He kept talking to me for such a long time but I **barely** knew him.
* It is **extremely** hot outside **today**.
* How **often** do you work out?
* Can I come home **tomorrow**?

## Use of "a", "an" and "the"

English has two articles: the and a/an. The is used to refer to specific or particular nouns; a/an is used to modify non-specific or non-particular nouns. We call the the definite article and a/an the indefinite article. For example, if I say, "Let's read the book," I mean a specific book. The definite article (the) is used before a noun to indicate that the identity of the noun is known to the reader.

## Frequency Adverbs

## **What is an Adverb of Frequency?**

An adverb of frequency is a word that is employed in a sentence to give more information about the verb, adjective or another adverb. Adverbs of frequency can be placed after the noun or pronoun that acts as the subject and before the verb if there is just one verb in a sentence. If there is more than one verb in a sentence , the adverb of frequency can be positioned before the main verb.

### **Definition of an Adverb of Frequency**

The word ‘frequency’, according to the Cambridge Dictionary, is defined as “the number of times something happens within a particular period, or the fact of something happening often or a large number of times.” So, an adverb of frequency is an adverb which depicts the number of times an action happens within a particular period of time. The Merriam Webster Dictionary defines the word ‘frequency’ as “the rate at which something happens or is repeated.” Therefore, an adverb of frequency can be defined as an adverb which denotes the rate at which something happens.

## **Examples of Adverbs of Frequency**

Have a look at the following sentences to understand how an adverb of frequency can be used.

* Ashish **often** likes to have food from hotels.
* Wiley **always** buys groceries from the supermarket.
* The teachers have been instructed to take attendance **every hour**.
* **Everyday**, the hospitals see a huge inflow of accident casualties.
* We **never** like to have litchi juice from any other store.

### **List of Adverbs of Frequency**

Given below is a list of examples of adverbs of frequency for your reference.

|  |  |  |
| --- | --- | --- |
| Examples of Adverbs of Frequency | | |
| Never | Seldom | Always |
| Every hour | Everyday | Often |
| Constantly | Ever | Eventually |
| Daily | Frequently | Hourly |
| Yearly | Generally | Monthly |
| Occasionally | Regularly | Sometimes |
| Rarely | Usually | Normally |
| Hardly ever | Scarcely | Now and then |

## Pronouns

## **What Is a Pronoun?**

A pronoun is used in the place of a noun. It substitutes the noun in a paragraph or piece of writing to avoid repetition of the noun. Pronouns can be used in singular and plural forms. The verb used in the sentence should be used in accordance with the particular form of the pronoun used.

Pronouns are generally classified into three main kinds.

| **Person** | **Singular Pronoun** | **Plural Pronoun** |
| --- | --- | --- |
| **First Person Pronoun** | **I, Me** | **We, Us** |
| **Second Person Pronoun** | **You, Your** | **You** |
| **Third Person Pronoun** | **He, She, It, Him, Her** | **They, Them, Their** |

### **Definition of a Pronoun**

A pronoun is defined as ‘a word that is used instead of a noun or a noun phrase’, according to the Cambridge Dictionary. The Merriam-Webster Dictionary defines pronouns as ‘any of a small set of words (such as *I*, *she*, *he*, *you*, *it*, *we*, or *they*) in a language that are used as substitutes for nouns or noun phrases and whose referents are named or understood in the context’. According to the Collins Dictionary, ‘A pronoun is a word that you use to refer to someone or something when you do not need to use a noun, often because the person or thing has been mentioned earlier. Examples are ‘it’, ‘she’, ‘something’, and ‘myself’.’

### Types of Pronouns

Demonstrative pronouns

Personal pronouns

Relative pronouns

Possessive pronouns

Reflexive pronouns

Intensive pronouns

Reciprocal pronouns

Subject pronouns

Object pronouns

Distributive pronouns

End Of Researches

# Ref websites: Duolingo, Khan Academy, W3school, EDX

Color Theme: Green (any types of greens)

Driving Question: How can year7 students develop an informational website which can support the youth community to be a well-informed person by sharing educational awareness?

Essential Question: How do we design an engaging and beneficial website for youth community to promote their educational growth and learning experiences?