Article

Nature of Dimensions

Satinder S. Malik*

Abstract

Dimension can be is seen as degree of freedom of movement of any object. Dimension is defined as attribute of an object which can vary from -∞ to +∞. Complete set of dimensions can define any object completely. For the purpose of complete description of an object five major groups of dimensions may be described. These are the dimension groups of Space, Time, Energy, Matter, and Consciousness. All dimension exist inter-dependent and interacting with other dimensions to formulate new dimension subset in various permutations and combinations.

Consciousness as a dimension is a novel concept. While in string theory & M-theory, 11 & 12 dimensions respectively are used, still all these are not the complete dimensions per se but the sub dimensions of space and matter interacting with time. The energy strings of string theory are not hypothetical but real ones and these strings only make up the elementary particles and such similar strings make up the dark energy and therefore space. The dimension of consciousness is represented by the mathematics involved in it. The principle of similarity, identity, symmetry, Fibonacci sequencing *etc* are the essential characteristics of this dimension. The restricting of dimensions is fundamental research in physics, because these dimensions give ways to further building blocks of understanding. Earth and stars are conscious entities. This is a novel concept. We can also reflect more on this. This fact has huge connotations for astrology getting connected to physics rather than being left alone as esoteric science. This is an area which can open new frontiers for researchers and entire humanity can benefit from this.

Keywords: Dimension, space, time, energy, matter, consciousness, truth, God.

Introduction

The professor with a grave face entered the class, he put the smart board on and demanded a black board with chalk to be placed. He drew a line on the blackboard and asked, what is it? A bright student full of initiate answered, “Sir, it is line which is one dimensional object”. Fine, said professor and went on two draw a plane and a cube and students answered correctly. Then professor asked students to watch carefully, something is changing in the picture. Students were amused but they couldn’t tell what. Professor said, “time, it is the fourth dimension”. Then he rubbed off everything and jets left a point on the blackboard and asked what is it? Students said a point. He asked, “how many dimensions” they say 0. He said even if we consider all sides of a point to be negligible still one dimension- that is matter. He projected the same point as bright light on smart board and asked, “now”? He went on explaining, this is energy. He then showed a spiral galaxy evolving in a compressed timeline and asked how many dimensions? He expected familiar answer 6 (3 dimensions of space, time, energy and matter. And they he added what is making this galaxy to evolve in such fashion. That is consciousness. Vedic mathematics contains

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such equations which reflect consciousness. The mathematics involved in the universal laws is an effect of consciousness.

The simple physical universe in which we live in and work, we are familiar with four dimensions, three dimensions of space and one of time. However, these four dimensions may not be sufficient to describe an object in space. For example, two stars of same volume may be at different stage of evolution and may contain different mass and different energy levels. So there is needs to evolve a dimension system which can describe various attributes. This would help in comparisons, knowing various sub dimensions and analysis of inter-dimensional interaction. Also, it might aid in evolution of theory of everything.

What is a Dimension?

In mathematics, **Dimension** is informally defined as the minimum number of coordinates needed to specify any point within it [1]. The dimension of an object is the number of degrees of freedom of a point that moves on this object. In other words, the dimension is the number of independent parameters or coordinates that are needed for defining the position of a point that is constrained to be on the object. For example, the dimension of a point is zero; the dimension of a line is one, as a point can move on a line in only one direction (or its opposite); the dimension of a plane is two, etc. An example of various dimensions of space is given at the end in Table.

In physics, Dimension can be is seen as degree of freedom of movement of any object. It lists three physical dimensions: from a particular point in space, the basic directions in which we can move are up/down, left/right, and forward/backward. Moving down is the same as moving up a negative distance. Moving diagonally upward and forward is just as the name of the direction implies; i.e., moving in a linear combination of up and forward. In its simplest form: a line describes one dimension, a plane describes two dimensions, and a cube describes three dimensions. In classical mechanics, space and time are different categories and refer to absolute space and time. That conception of the world is a four-dimensional space. The four dimensions of space-time consist of events that are not absolutely defined spatially and temporally, but rather are known relative to the motion of an observer.

A temporal dimension is a dimension of time. Time is often referred to as the "fourth dimension" for this reason, but that is not to imply that it is a spatial dimension. A temporal dimension is one way to measure physical change. It is perceived differently from the three spatial dimensions in that there is only one of it, and that we cannot move freely in time but subjectively move in one direction.

Normally, changing definitions within the subjects (physics and mathematics) and inter-dimensional interaction which can be taken up as a completely new dimension, has the potential to cause confusion and limit the unification of theories. For the purpose of our paper **Dimension is defined as an attribute of an object which can vary from -∞ to +∞. Complete set of dimensions can define any object completely.**Dimension is a measurable extent of a particular

kind. For the purpose of classification dimensions can be classified and grouped under the major dimension.

Dimensions Groups

For the purpose of complete description of an object five major groups of dimensions are listed. These are the dimension groups of **Space, Time, Energy, Matter, and Consciousness**. All dimension exist inter-dependant and interacting with other dimensions to formulate new dimension subset in various permutations and combinations.

Dimension of Space

The space is made up of aether or dark energy. More apt word would be transparent energy or the Sanskrit word 'Adristam' meaning unseen. The vibration can be zero only at the center of Universe from where it has expanded following the cauldron of time. The constructive interference has filled the space with energy and hence matter and may be the destructive interference formed the space. Not all wavelet strings find a buddy to intermingle and so they keep spreading in their infinitesimally small undetectable forms outwards (from center of universe). **These wavelets, waves, particles which are leftover of continuous creation continue to travel the space can be perceived as dark energy**. The space therefore is made up of dark energy or 'Adrishtam'.

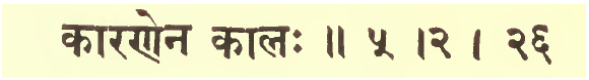
Space has traditionally been divided in 3 dimensions. In three dimensional space, we can have subset of multi dimensions. The dimension of the tesseract is for example 4 [1]. Basically any other numbers of more than three, which has previously been known as higher dimensions are actually subset of dimension of space described alternatively. Although the notion of higher dimensions goes back to René Descartes, substantial development of a higher-dimensional geometry only began in the 19th century, via the work of Arthur Cayley, William Rowan Hamilton, Ludwig Schläfli and Bernhard Riemann. Riemann's 1854 Habilitationsschrift, Schläfli's 1852 Theorie der vielfachenKontinuität, and Hamilton's discovery of the quaternions and John T. Graves' discovery of the octonions in 1843 marked the beginning of higher-dimensional geometry. The state-space of quantum mechanics is an infinite-dimensional function space. Minkowski space [1] first approximates the universe without gravity. Higher-dimensional spaces frequently occur in mathematics and the sciences. They may be parameter spaces or configuration spaces such as in Lagrangian or Hamiltonian mechanics; these are abstract spaces, independent of the physical space we live in.

Dimension of Time

The equations used in physics to model reality do not treat time in the same way that humans commonly perceive it. The equations of classical mechanics are symmetric with respect to time, and equations of quantum mechanics are typically symmetric if both time and other quantities

(such as charge and parity) are reversed. In these models, the perception of time flowing in one direction is an artifact of the laws of thermodynamics (we perceive time as flowing in the direction of increasing entropy). The dimension of time is most perplexing. The speed of time is different in different reference frames. While many science fiction authors portrayed revere time travel (going back to the past) but as per the proposed theory it is not a possibility. The time flow may be reversed but events will continue in progressive fashion. What was done cannot be undone it can change and take any other alternate form.

The best-known treatment of time as a dimension is Poincaré and Einstein's special relativity (and extended to general relativity), which treats perceived space and time as components of a four-dimensional manifold, known as space-time. The dimension of time may have subset dimensions as speed and acceleration of time and other such features. While interacting with fabric of space space-time may exhibit worm holes and other such characteristic features. Time has also been reflected upon by Maharishi Kanad.



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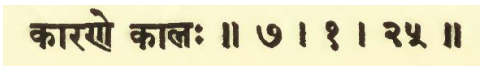
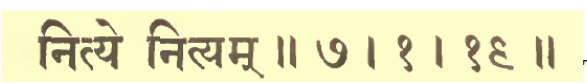


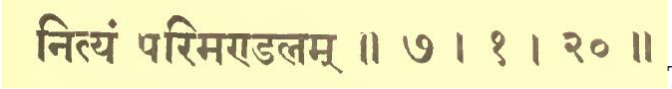
Time is the cause of such happenings as well reason for time itself. Here, it states what defines the space as interplay of three attributes Sat, Rajas and Tamas and time. These are also the attributes of consciousness in qualitative manner and when substratum is formed wave and particle, these emerge there as forces.

Dimension of Energy

Energy has many vibrational attributes like frequency, amplitude, polarization, velocity, wavelength, electro-magnetism etc in interaction with dimension of space and time. Although Energy and Matter are inter-convertible and both can be grouped under same group dimension, for the fact both are existing most pervasively in our universe both have been group independently. Energy makes up the matter. Strings of energy coil and interact with space time and other energy strings to form in to various elementary particles. String theory [4] contains the idea that the point-like particles of particle physics can also be modeled as one-dimensional objects called strings. String theory describes how strings propagate through space and interact with each other. In a given version of string theory, there is only one kind of string, which may look like a small loop or segment of ordinary string and it can vibrate in different ways. On distance scales larger than the string scale, a string will look just like an ordinary particle, with its mass, charge, and other properties determined by the vibrational state of the string. In this way, all of the different elementary particles may be viewed as vibrating strings. This is what leads us to matter.



The waves are eternal.



The waves are then around the universe.

Dimension of Matter

The matter is formed by many energy strings interaction with other dimensions. Matter has attributes like mass, density, gravity etc. Subset of 10 dimensions is used to describe superstring theory (6D hyperspace + 4D), 11 dimensions can describe supergravity and M-theory (7D hyperspace + 4D). Edward Witten of the Institute for Advanced Study suggested that the five different versions of string theory might be describing the same thing seen from different perspectives.[4] He proposed a unifying theory called "M-theory", in which the "M" is not specifically defined but is generally understood to stand for "membrane". M-theory brought all of the string theories together. It did this by asserting that strings are really one-dimensional slices of a two-dimensional membrane vibrating in 11-dimensional space-time.

The pseudo-Riemannian manifolds of general relativity describe space-time with matter and gravity. [2] If two protons smash together at high enough speeds, they have the ability to create a tiny black hole that would exist for just a fraction of a second before disappearing. The collision would open up a little bubble of inter-dimensional space leading to an event known as vacuum decay in quantum physics. With enough gravity to interact with our world, the newly formed “Cosmic Death Bubble” would grow at the speed of light, rapidly change the physics of our universe and render it uninhabitable. Probably during the extinction cycle of universe such event will take precedence.

The dimension of matter is about various substances and their attributes . Maharishi Kanad has written ‘Visheshaka Sutra’ on this subject. Visheshaka also mean Special Knowledge which in turn means science. They form a part of Sankhya philosophy which deals with detailed investigation and description about of the Nature and God. Dravya is matter or substance.

एकद्रव्यत्वान्न द्रव्यम् ॥ २ । २ । २३ ॥

It means that all other matter is made of same substratum matter.

नापि कर्म्माऽचाक्षुषत्वात् ॥ २ । २ । २४ ॥

Not even the action is visible or it can not be substantiated. There are three main forces arise due to attributes, these are Sat, Rajas and Tamas. Sat carries the intelligence for ensuring integrity of ensuing formatting in matter. Rajas has the controlling forces and Tamas includes binding forces.

गुणस्य सतोऽपवर्गः कर्म्मभिः साधर्म्यम् ॥ २ । २ । २५ ॥

Attributes of Sat and its action represent fragile, weaker forces.

सतोलिङ्गाभावात् ॥ २ । २ । २६ ॥

Sat doesn’t leave any mark.

नित्यवैधम्म्यात् ॥ २ । २ । २७ ॥ The continuous (wave) so created now differs in attributes from the substratum.

अनित्यश्चायं कारणतः ॥ २ । २ । २८ ॥ There is a reason for the break in continuity too.

न चासिद्धं विकारात् ॥ २ । २ । २९ ॥ There could be a fault.

अभिव्यक्तौ दोषात् ॥ २ । २ ३० ॥ The faults are expressed.

संमोगाद्विभागाच्च शब्दाच्च शब्दनिष्पत्तिः ॥ २ । २ । ३१ ॥

By the conjunction of substratum or division, substratum (another variation) is formed.

लिङ्गाच्चानित्यः शब्दः ॥ २ । २ । ३२ ॥

There is mark of discrete substratum.

द्वयोस्तु प्रवृत्त्योरभावात् ॥ २ । २ । ३३ ॥

These two, continuous (wave) and non continuance (particle).

प्रथमाशब्दात् ॥ २ । २ । ३४ ॥

सम्प्रतिपत्तिभावाच्च ॥ २ । २ । ३५ ॥

From the first substratum, possibility of recognition thus emerges. Therefore, from the initial substratum emerges the wave and particles forming energy and matter.

सन्दिग्धाः सति बहुत्वे ॥ २ । २ । ३६ ।

This was many different types of probable forms are formed. It sums up that all elements are from same substance (Dravya)

एकद्रव्यत्वात् ॥ ७ । १ । ७ ॥

Maharishi Kanad goes on to reflect on the smallest and the biggest.

एतेन दीर्घत्वह्रस्वत्वे व्याख्याते ॥ ७ । १ । १७ ॥

अनित्येऽनित्यम् ॥ ७ । १ । १८ ॥ The particles are non eternal.

रूपरसगन्धस्पर्शव्यतिरेकादर्थान्तरमेकत्वम् ॥ ७ । २ । १ ॥

Since he wrote at a time when human sense organs were only means examination of substances. Difference in shape, taste, colour, smell, touch of various substances is there but the integral substance matter is the same. This is a scientific fact because all elements though different by arrangement of atomic particles yet they are made of same elementary particles. He described why these are different from smallest to largest.

निःसंख्यत्वात् कर्म्मगुणानां सर्व्वैकत्वं न विद्यते ॥ ७ । २ । ४ ॥

Without the numbers actions and attributes can not be same everywhere. And this causes the incorrect inference (the numbers) that the elements are different.

एकत्वाभावाद्भक्तिस्तु न विद्यते ॥ ७ । २ । ६ ॥

Because in existence of only one type no secondary derivations can occur. Here, this can be easily related to elements but one has to resist this temptation and has to consider this for the primordial sub sub particle structures such as quarks or even the smaller ones yet to be discovered or hypothetical strings postulated in string theory.

कार्य्यकारणयोरेकत्वैकपृथक्त्वाभावादेकत्वैपृथक्त्वं न विद्यते

In such fashion of different action and cause, what is essentially the same appears different.

एतदनित्ययोर्व्याख्यातम् ॥ ७ । २ । ८ ॥

The non eternals (particles) are explained.

अन्यतरकर्म्मज उभयकर्म्मजः संयोगाजश्च संयोगः ॥ ७ । २ । ९ ॥

Action at a different point and action of the interacting points can also be an instance of coincidence.

संयोगविभागयोः संयोगविभागाभावोऽणुत्वमहत्त्वाभ्यां व्याख्यातः ॥ ७ । २ । ११ ॥

The minuteness and magnitude (of waves) happen because of coincidence of conjunctions or disjunctions, or absence of conjunctions and disjunctions.

कर्म्मभिः कर्म्माणि गुणैर्गुणा अणुत्वमहत्त्वाभ्यामिति ॥७।२।१२॥

The minuteness and magnitude is due to actions leading to further actions and attributes mixing and forming further attributes and thus leading to permutations and combination of such coincidences.

युतसिद्धयभावात् कार्य्यकारणयोः संयोगविभागौ न विद्येते

Such conjunctions and disjunctions can not be determined as they do not exist independently. They only get produced as a resultant of conjunctions and disjunctions at that instance and lead to further such conjunctions or disjunctions.

गुणत्वात् ॥ ७ । २ । १४ ॥ गुणोऽपि विभाव्यते ॥ ७ । २ । १५ ॥

This is the property and attributes or properties can be determined.

निष्क्रियत्वात् ॥ ७ । २ । १६ ॥

असति नास्तीति च प्रयोगात् ॥ ७ । २ । १७ ॥

Such coincidences also lead to nun reacting or inert substances/ waves and cancellations as well as formations.

संयोगिनो दण्डात् समवायिनो विशेषाच्च ॥ ७ । २ । १९ ॥

The waves which are made up of conjunctions (constructive interference) follow the straight path whereas those which are joined in special manner propagate in special manner.

एकदिक्काभ्यामेककालाभ्यां सन्निकृष्टविप्रकृष्टाभ्यां परमपरञ्च

कारणपरत्वात् कारणापरत्वाच्च ॥ ७ । २ । २२ ॥

परत्वापरत्वयोः परत्वापरत्वाभावोऽणुत्वमहत्त्वाभ्यां व्याख्यातः ॥ ७ । २ । २३ ॥

The minuteness or magnitude is due near or far in space and at an instance, cause or integration of such causes and reaching excellence (optimum conjunctions) inverse of it or lack of. He

further describes how the attributes change from one stage to another. He explains, like this the resultant action also lead to the cause or permutation and combination of them lead to further such formation.

इहेदमिति यतः कार्य्यकारणयोः स समवायः ॥ ७ । २ । २६ ॥

Dimension of Consciousness

The consciousness may be defined as a fact of awareness (itself being the interpreter). It is the ability to exert influence on itself and surroundings. Consciousness can also be defined as intelligence or sentience. We must not stop here for lack of appropriate word because this is a completely un-discussed dimension. One can also draw an analogy to a super-intelligent computer program that is self-aware and capable of controlling itself and the surrounding given the medium of exerting influence.

There have been many instances of astronomers observing **galaxies** that seem to be connected and moving in **sync** with each **other**. A study by Lee, published in The Astrophysical Journal found that hundreds of **galaxies** are rotating in exactly the same way, despite being millions of light years apart [5].

Radio signals bearing the tell-tale signature of aurorae [6] caused by an interaction between a star and its planet has been predicted for over thirty-years. Now, for the first time astronomers have been able to detect the signature using the sensitive Dutch-led Low Frequency Array (LOFAR) radio telescope coming from the nearby red dwarf star GJ1151. “We adapted the knowledge from decades of radio observations of Jupiter to the case of this star” said Dr. Joe Callingham, ASTRON postdoctoral fellow and co-author of the study. “A scaled up version of Jupiter-Io has long been predicted to exist in the form of a star-planet system, and the emission we observed fits the theory very well.”

The universe has an intelligent design. Natural Intelligence has been present in the universe indicating presence of dimension of consciousness. While the space, time and energy form the other dimensions, consciousness is also a complete dimension in itself. The mathematics involved in the universal laws is an effect of consciousness. There are various levels of consciousness and at each level there is a different realm within the dimension. Consciousness has created the entire material world with the dimensions of space, matter and time; therefore, it is the prime dimension and all other dimensions are dependent on its plan.The Consciousness is absolute and transcends the three dimensions manifesting the entire universe preceding them. Symmetry is one of the features of consciousness. The mathematics and intelligence of the universe describes the consciousness of the universe.

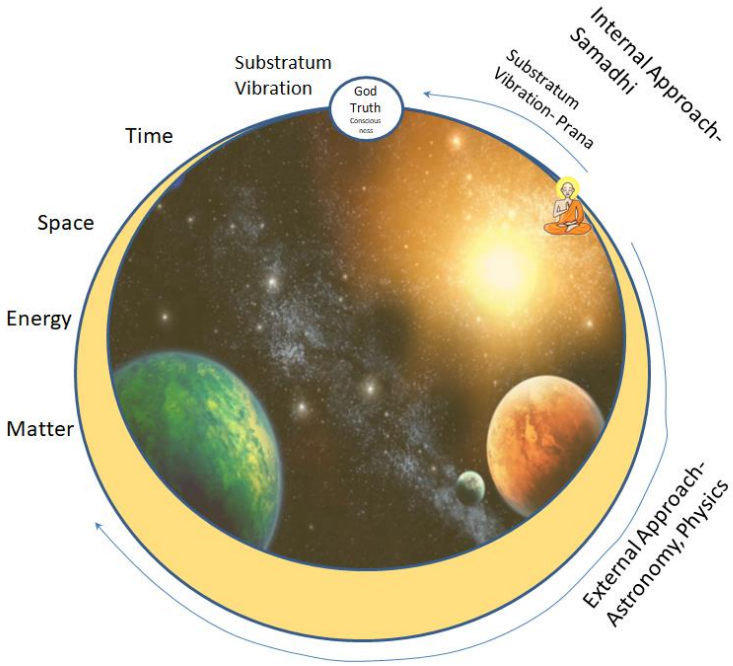
विभवान्महानाकाशस्तथा चात्मा ॥ ७ । १ । २२ ॥

Maharishi Kanad says the Akasha (space) is vast and so is Atma (consciousness) meaning that it is all pervasive. It is that Sat or dimension of intelligence.

द्वाविमौ पुरुषौ लोके क्षरश्चाक्षर एव च । क्षरः सर्वाणि भूतानि कूटस्थो$क्षर उच्यते
Bhagwat Geeta Bg.15.16.

There are two types of consciousness, one that is non-decaying and other which is decaying. Consciousness in all elements is decay able (perishable) and the one that is kuthastha (Soul) is called non decaying. Kuta can also be understood as root or deep.

The consciousness which is there in all elements due to the intelligence innate of substratum is perishable or changeable as the element is set to undergo transformation. This consciousness is spread across the universe and known as Sat. It is what Yogis connect their Soul to, to seek enlightenment.



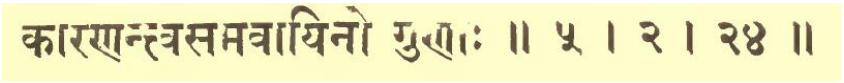
Defining Objects with Dimension Groups

The conception of the world currently is four-dimensional. The dimension of a mathematical space (or object) is informally defined as the minimum number of coordinates needed to specify any point within it. The dimension may start from absolute zero, any relative position and may run to infinity. The amount of matter contained in a unit 3D space is variable and similarly the amount of energy contained in 3D space is also variable. Two stars of same volume may be at different stage of evolution and may contain different mass and different energy levels. Man with natural intelligence is also a cosmic object without giving attribute of consciousness it would not be possible to define man cosmically. Stars have consciousness and also other heavenly bodies. Earth is also conscious and follows the astronomical laws and maintains balance. The movement of magma, plate tectonics, magnetic field, winds, ocean currents, cyclic activities of various elements and occurrences make earth conscious in a unique way. Recently papers were published

showing water has memory, sand dunes communicate with earth other so do the star systems, we may not know it yet. The harmony (or the lack of it) in the universe is a characteristic feature.

Interaction of various dimensions

Visheshaka also hints at formation of matter and energy. It brings out what is the reason for substratum to take various forms in wave and then particles.



The reason is combination of attributes of Sat, Rajas and Tamas.

These attributes of Sat, Rajas and Tamas also define the space.

Conclusion

From the classical 4 dimensions of space time, we have 5 dimensions groups Consciousness, Space, Time Energy and Matter. Consciousness is a unique dimension. It reflects the sentience or intelligence and or ability to control itself and/or its surroundings. Without it no intelligence can ever originate or exist in the universe. The dimension of consciousness can be understood by drawing analogy to capacity of an artificial intelligence or ability of a computer to make number of computations per second. Consciousness has created nature through the basic vibration of Substratum. The main cause is the attributes of this substratum Sat, Rajas, Tamas and Time. The dimension of the Vibration (Energy and hense Matter) is a significant formal dimension. Energy and matter are single group dimension with dual nature (wave and particle). Both are grouped apart because both are pervasive in abundance in universe together. Therefore we need dimension of space, time, energy, matter and consciousness to define an object in the universe.

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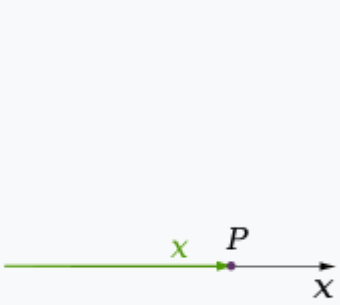
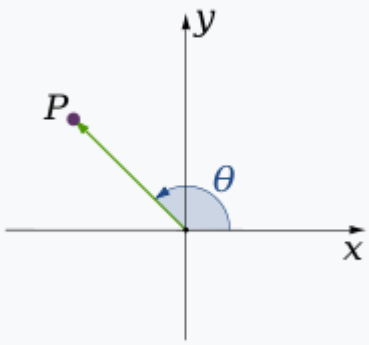
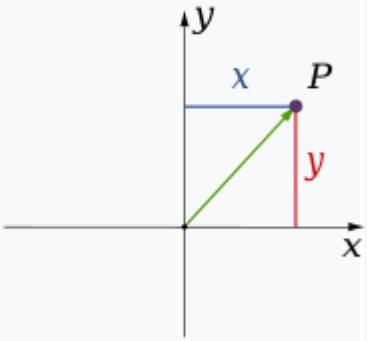
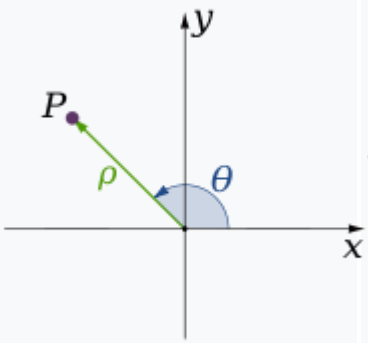
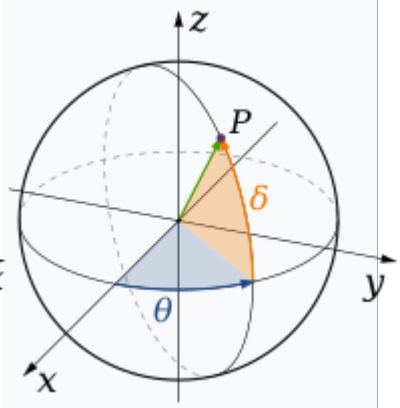
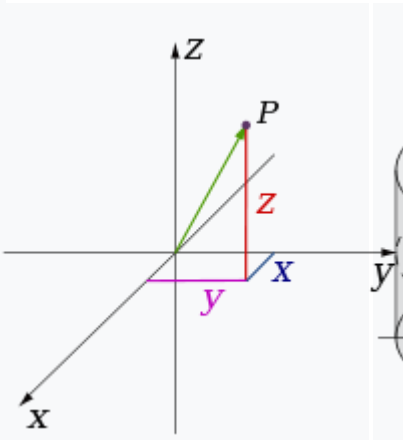
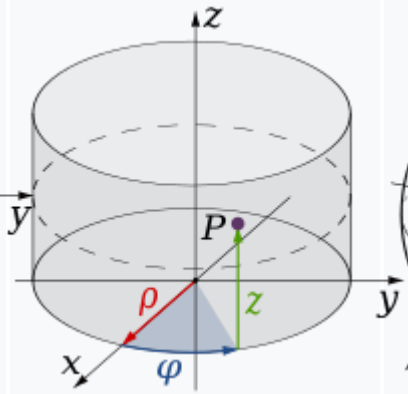
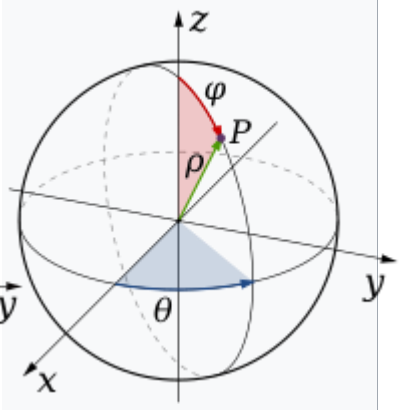
Table 1

Number of Sub dimensions	Examples Space co-ordinate systems
1	 **Number line**  **Angle**
2	 **Cartesian** (two-dimensional)  **Polar**  **Latitude and longitude**

3			
	Cartesian (three-dimensional)	**Cylindrical**	**Spherical**