

THE GREEK ALPHABET

Name	Pronunciation	CAP	lower	Name	Pronunciation	CAP	lower
Alpha	AL fuh	A	α	<i>Nu</i>	NOO	N	ν
Beta	BAY tuh	B	β	<i>Xi</i>	ZI	Ξ	ξ
<i>Gamma</i>	GAM uh	Γ	γ	<i>Omicron</i>	O mih kron	O	\omicron
Delta	DEL tuh	Δ	δ	Pi	PI	Π	π
<i>Epsilon</i>	EP sih lon	E	ϵ	<i>Rho</i>	ROE	P	ρ
<i>Zeta</i>	ZAY tuh	Z	ζ	Sigma	SIG muh	Σ	σ
<i>Eta</i>	AY tuh	H	η	<i>Tau</i>	TAO, TAW	T	τ
Theta	THAY tuh	Θ	θ	<i>Upsilon</i>	UP sih lon	Υ	υ
<i>Iota</i>	eye OH tuh	I	ι	Phi	FI, FEE	Φ	ϕ
<i>Kappa</i>	KAP uh	K	κ	<i>Chi</i>	KI	χ	χ
Lambda	LAM duh	Λ	λ	<i>Psi</i>	SI, SEE	Ψ	ψ
Mu	MYOO	M	μ	Omega	o MEH guh	Ω	ω

MATHEMATICAL SYMBOLS

Symbol	Definition	Example of Usage
\propto	proportional to	Time spent studying \propto grade earned in a class
\approx	approximately equal to	$5,367,831 \approx 5,367,832$
\sim	about; approximately	The population of the US is $\sim 300,000,000$.
\equiv	defined as; identical to	velocity \equiv change in position per change in time
\neq	not equal to	if $a = 3$ and $b = 5$, $a \neq b$
$>$	greater than	$2 + 2 > 3$
$<$	less than	$2 + 2 < 5$
\geq	greater than or equal to	If $x + 5 \geq 12$, then $x \geq 7$
\leq	less than or equal to	$f \leq \mu N$
\gg	much greater than	$5,367,831,729,405 \gg 1$
\ll	much less than	$1 \ll 5,367,831,729,405$
\Rightarrow	leads to; yields	$a + b = c \Rightarrow b = c - a$
\therefore	therefore	$a = b$ and $b = c \therefore a = c$
$\sqrt{\quad}$	square root	$\sqrt{(9 + 16)} = 5$
Σ	the sum of	$\Sigma \mathbf{F} = m\mathbf{a}$
Δ	change in	$\mathbf{v} \equiv \Delta \mathbf{d} / \Delta t$
\mathbf{x}	the vector "x"	the displacement vector $\mathbf{x} = (4\text{m}, 7\text{m})$
\parallel	parallel to	the ceiling is \parallel to the floor
\perp	perpendicular to	the floor is \perp to the wall
$ x $	absolute value of x	$ -23 = 23$
$ \mathbf{x} , x$	the scalar value of \mathbf{x}	$\mathbf{a} = (7\text{m}; 30^\circ) \therefore \mathbf{a} = 7\text{m}; \mathbf{c} = (3\text{m}, 4\text{m}) \therefore c = 5\text{m}$

PhyzReference: Directions

Phyz Ref Manual is Phyz

In physics, we must often be mindful of **direction**. If something is moving, for example, it must be moving in some **direction**. Or if a force is being exerted on an object, that force is being exerted in some **direction**. Below are a few reference diagrams that sort out the various ways scientists and mathematicians specify directions.

One-Dimensional (1D)

A particle that is constrained to motion in one dimension can move only forward or backward along a line. Surely you have fond memories of the “number line.” The number line is an example of “one-dimensional space,” also known as a “line.”

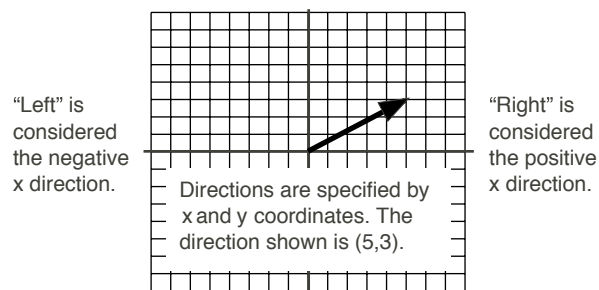


Two-Dimensional (2D)

Two-dimensional space is known as a “plane.” Examples of 2D space include a table top, the floor, the glass in a window, or any other flat surface.

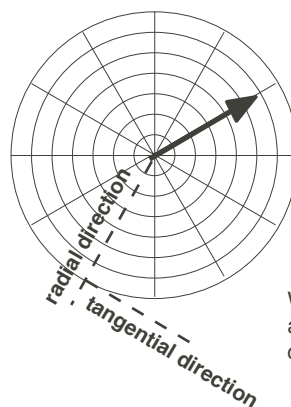
Rectangular (Cartesian) Coordinates

“Up” is considered the positive y direction.



“Down” is considered the negative y direction.

Polar Coordinates



Directions are specified in terms of angles by the radial lines (“spokes”). The concentric circles indicate length. The arrow shown (which is identical to the arrow on the rectangular coordinates) is denoted $(5.8; 30^\circ)$.

We will discuss further rectangular and polar coordinates later on in the course.

Three-Dimensional (3D)

Three-dimensional space is known simply as a “space.” Space includes all the familiar geometric directions. All real objects occupy three dimensions. For instance, a rectangular solid (like a shoebox) has dimensions of length, width, and height.

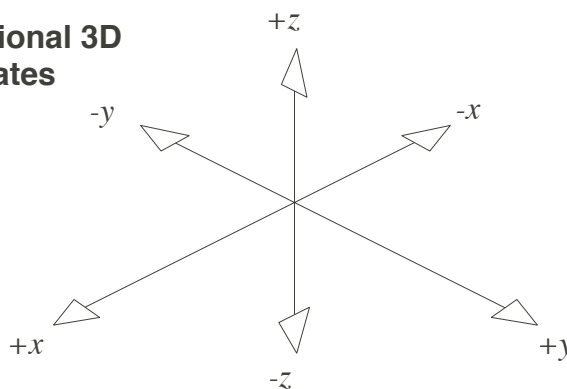
Symbolic Notation

- Left ←
- Right →
- Up ↑
- Down ↓
- In ⊗ < Circled x represents tailfeathers of an arrow
- Out ⊙ < Circled • represents point of an arrow

*IN is away from you: into the paper, into the board

**OUT is toward you: out of the paper, out of the board

Conventional 3D Coordinates



Vocab

Collinear: along the same line

Parallel: in the same direction

Concurrent: at the same point

Antiparallel: in opposite directions