	Category	単語	Words	Definitions/descriptions
1	General	電磁気学	electricity and magnetism	
2	General	量子力学	quantum mechanics	
3	General	統計力学	statistical mechanics	
4	General	卒業論文	senior thesis	
5	General	大学院生	graduate student	
6	General	学部生	undergraduate student	
7	General	理学研究科	Graduate School of Science	
8	General	理学部	Faculty of Science	
9	General	前期/後期	first semester/ second semester	
10	General	経験則	empirical rule	A rule derived from experiments or observations rather than theory.
11	Matter	分子	molecule	The smallest unit into which any substance is divided into without losing its chemical nature, usually consisting of a group of atoms.
12	Matter	原子	atom	The smallest part of an element that can exist, consisting of a small dense nucleus of protons and neutrons surrounded by orbiting electrons.
13	Matter	原子核	nucleus (pl. nuclei)	The most massive part of an atom, consisting of protons and neutrons.
14	Matter	核子	nucleon	A collective term for a proton or neutron, i.e. for a constituent of an atomic nucleus.
15	Matter	陽子	proton	A positively charged nucleon.
16	Matter	中性子	neutron	An elementary particle with zero charge and with rest mass nearly equal to that of a proton. A charge-neutral nucleon.
17	Matter	電子	electron	A stable elementary particle whose negative charge $-e$ defines an elementary unit of charge.
18	Matter	光子	photon	A quantized particle of electromagnetic radiation (light).
19	Matter	水素	hydrogen	An element whose atom consists of one proton and one electron.
20	Matter	元素の周期表	periodic table of the elements	A table of chemical elements arranged in order of their atomic numbers.
21	Math	足し算	addition	The mathematical operation represented by a plus symbol (+).
22	Math	引き算	subtraction	The mathematical operation represented by a minus symbol (−).
23	Math	整数	integer	A whole number, i.e. does not contain a fraction.
24	Math	偶数	even number	A number that can be written as $2n$, where n is an integer.
25	Math	奇数	odd number	A number that can be written as $2n+1$, where n is an integer.
26	Math	分数	fraction	A number expressed as p over q (p/q).
27	Math	小数	decimal	A fraction whose denominator is a power of ten and whose numerator is expressed by figures placed to the right of a decimal point.
28	Math	分子	numerator	The number above the line in a fraction.
29	Math	分母	denominator	The number below the line in a fraction.
30	Math	積分	integration	The process of finding an integral, i.e. the function for which the derivative is the given function. The integral can express the area under the graph of the given function.
31	Math	近似	approximation	Something that is similar but not exactly equal to something else. E.g. an approximate value for some quantity can be used if the true value is too difficult to calculate, or an approximate model can be used if the true model is too complicated.
32	Mechanics	精度	precision	A measure of the smallness of random deviation from the mean value.
33	Mechanics	確度	accuracy	A measure of the smallness of systematic deviation from the true
34	Math	行列	matrix (*pl.* matrices)	An $m \times n$ matrix is a rectangular array of numbers (do not have to be numbers) set out in m rows and n columns.
35	Math	円柱	cylinder	A geometric shape with parallel sides and circular cross-section.
36	Math	球	sphere	A solid object that is completely round, with every point on its surface at an equal distance from the center.

	Category	単語	Words	Definitions/descriptions
37	Math	立方体	cube	A three-dimensional object bounded by six equal squares, with neighbouring squares perpendicular to each other.
38	Math	長方形	rectangle	A four-sided shape with four straight lines joined at right angles. Unlike a square, the sides do not all have to be of equal length.
39	Math	平行四辺形	parallelogram	A two-dimensional shape with opposite sides parallel and equal in length. The three-dimensional counterpart of a parallelogram is a parallelepiped.
40	Math	台形	trapezoid	A two-dimensional shape with 4 straight sides that has a pair of opposite sides parallel.
41	Math	正三角形	equilateral triangle	A triangle in which all three sides are equal.
42	Math	二等辺三角形	isosceles triangle	A triangle that has two sides of equal length.
43	Math	半径	radius (*pl.* radii)	The distance from the center of a circle (or sphere) to its circumference.
44	Math	直径	diameter	A straight line going from one side of a circle to the other side, passing through the center of the circle.
45	Math	表面積	surface area	The total area of the faces or curved surfaces of a solid object.
46	Math	体積	volume	The amount of three-dimensional space occupied by a body or enclosed by a closed boundary.
47	Math	直角	a right angle	An angle of 90°
48	Math	平行	parallel	The relationship between two lines (or planes) that never meet.
49	Math	垂直	perpendicular	The relationship between lines or surfaces that intersect at right angles.
50	Math	直交	orthogonal	Orthogonality is an extension of the idea of perpendicularity to higher dimensions and non-geometric objects.
51	Math	原点	origin	A fixed point from which coordinates are measured.
52	Math	対数関数	logarithm	The power to which a fixed number (the base) must be raised in order to recover a given number.
53	Math	指数関数	exponential	The function e^x, which is equal to its own derivative. (e=2.7182818 …)
54	Math	平均	mean	For the set of numbers $a_1, a_2, a_3, \ldots a_n$, the value given by $(a_1+a_2+a_3+\ldots+a_n)/n$. Also commonly known as the average.
55	Math	桁数	an order of magnitude	A power of 10. The value of physical quantities are often given to an order of magnitude. For example, 2.3×10^5 and 6.9×10^5 are of the same order of magnitude.
56	Math	次元	dimension	(1) Combinations for any physical quantities that can be expressed in terms of base units (such as meter, kg and second) of fundamental physical quantities (such as length, mass and time). (2) In geometry, the dimension of the space is the minimum number of coordinates required to specify any point within the space.
57	Math	複素数	complex number	A number that can be expressed as $a + ib$, where i is the imaginary unit satisfying $i^2 = -1$ and a and b are real numbers.
58	Math	実数	real number	A number with no imaginary part. This can be expressed as $a + 0i$
59	Math	虚数	imaginary number	A number with no real part. This can be expressed as $0 + ib$
60	Math	円筒座標	cylindrical coordinate system	A three dimensional coordinate system in which a position is specified by radial distance ρ, azimuthal angle φ, and axial distance z.
61	Math	球座標	spherical coordinate system	A three dimensional coordinate system in which a position is specified by distance r from the origin, polar angle θ, and azimuthal angle φ.
62	Math	極角	polar angle, θ	In two dimensions, the polar angle is measured counterclockwise from the x-axis to a line drawn from the origin to some given point in the x-y plane. In three dimensions, the polar angle is measured from the z-axis to a line drawn from the origin to some given point in the 3-dimensional space.
63	Math	方位角	azimuthal angle, φ	In three dimensions, after projection of the vector between the origin and some given point of interest onto the x-y plane, the azimuthal angle is the angle measured counterclockwise from the x-axis to this projected line.

	Category	単語	Words	Definitions / descriptions
1	Mechanics	並進	translation	The movement of a body or system in such a way that all points are moved in parallel directions through equal distances.
2	Mechanics	運動方程式	an equation of motion	Equation that describes the motion or evolution of a system as a function of time.
3	Mechanics	位置	position	The location of an object relative to the origin of an arbitrary set of coordinates.
4	Mechanics	速度	velocity	The rate of change of position with time.
5	Mechanics	加速度	acceleration	The rate of change of velocity with time.
6	Mechanics	質量	mass	A measure of a body's inertia, i.e. its resistance to acceleration: $a = F/m$. Can also be defined in terms of the gravitational attraction between two bodies.
7	Mechanics	運動量	momentum (*pl.* momenta)	The product of the mass and the velocity of a particle.
8	Mechanics	角速度	angular velocity	The rate at which a body rotates about an axis.
9	Mechanics	慣性モーメント	moment of inertia	The resistance of an object to changes of its angular velocity.
10	Mechanics	角運動量	angular momentum	The product of the angular velocity of a body and its moment of inertia about the axis of rotation.
11	Mechanics	位置エネルギー	potential energy	The energy associated with the position of objects in a system.
12	Mechanics	運動エネルギー	kinetic energy	The energy associated with the motion of a system.
13	Mechanics	摩擦	friction	Force opposing the sliding of one surface over another.
14	Mechanics	重力	gravity	The attractive force between two bodies which is proportional to the product of their masses.
15	Mechanics	振動	oscillation	A regular movement between one position and another or between one amount and another.
16	Mechanics	調和振動子	a harmonic oscillator	An oscillator which has sinusoidal like motion.
17	Mechanics	共鳴	resonance	A condition in which a vibrating system responds with maximum amplitude to an alternating driving force, which occurs when the driving frequency coincides with the natural frequency of the system.
18	Mechanics	振幅	amplitude	The peak value of an alternating quantity in either the positive or negative direction.
19	Mechanics	位相	phase	The state of development of a periodic quantity, specifically the fraction of the whole period that has elapsed.
20	E&M	電荷	charge	A property of an elementary particle that determines the force it experiences in the presence of an electric or magnetic field. Usually measured in units of the magnitude of the negative charge of the electron, *e.*
21	E&M	引力	attractive force	e.g. The force between positive and negative charges is attractive.
22	E&M	斥力	repulsive force	e.g. The force between two positive or two negative charges is repulsive.
23	E&M	クーロン力	Coulomb force	The force between two charged particles.
24	E&M	周波数	frequency	The rate of repetition of a regular event, e.g. the number of cycles of an oscillation per second.
25	E&M	周期	period	The time it takes to complete one cycle of an oscillation.
26	E&M	電流	current	A flow of electric charge through a substance.
27	E&M	電圧	voltage	The difference in the electric potential between two points in a circuit that gives rise to a force on charged particles, thus inducing a current. The induced current is related to the resistance of the circuit through Ohm's law: $I = V/R$.
28	E&M	オシロスコープ	oscilloscope	An instrument used to provide a visual image of electrical signals, i.e. their amplitude and time evolution.
29	E&M	抵抗	resistance	A measure of a substances' opposition to the flow charge when a voltage (potential difference) is applied. It is related to the voltage and current via Ohm's law as $R = V/I$.
30	E&M	並列	in parallel	Two capacitors connected in this way give a total capacitance that is the sum of the two.
31	E&M	直列	in series	Two resistors connected in series give a total resistance that is the sum of the two.
32	E&M	エックス線回折	X-ray diffraction	The diffraction of X-rays by a crystal whose atomic separations are comparable in size to the wavelength of X-rays. (Diffraction is the spreading or bending of waves as they pass through an aperture (or series of apertures as in the case of the crystal) or round the edge of a barrier.)
33	E&M	反射	reflection	The return of all or part of a beam of particles or waves when it encounters a boundary between two media.
34	E&M	屈折率	index of refraction	The parameter that characterizes the change in direction of a wave when it enters another medium.
35	E&M	干渉	interference	The interaction between two or more wave motions affecting the same part of a medium such that the total disturbance is the vector sum of the disturbances resulting from each of the individual waves.

	Category	単語	Words	Definitions/descriptions
1	QM	不確定性原理	the uncertainty principle	The fundamental principle often expressed by the relation $\Delta x \bullet \Delta p \geq h$.
2	QM	パウリの排他律	the Pauli exclusion principle	The rule stating that no two identical fermions can be in the same quantum state.
3	QM	量子化	quantization	The procedure involved in transforming from a classical to a quantum understanding of physical phenomena whereby variables that are continuous in the classical theory become quantized, i.e. can only take on certain discrete values.
4	QM	スピン	spin	The intrinsic angular momentum of an elementary particle.
5	QM	対称性	symmetry	The property of a system that leaves the system unchanged after a certain transformation.
6	QM	束縛状態	bound state	A state in which a particle is subject to a potential such that the particle has a tendency to remain localised in one or more regions of space.
7	QM	基底状態	the ground state	The lowest stable energy state of a system.
8	QM	励起状態	excited state	An unstable state of a system whose energy is greater than that of the ground state.
9	QM	励起エネルギー	activation energy	The height of the energy barrier separating two minima of potential energy.
10	QM	縮退	degeneracy	A situation in which two or more distinct states have the same energy.
11	QM	摂動	perturbation	A small deviation from a known or solved reference system.
12	QM	消滅（生成）演算子	annihilation (creation) operator	In the context of quantum mechanics, where the energy levels of a system are discretised, an annihilation (creation) operator can be considered as an operator that decreases (increases) the number of particles in a given energy state by one.
13	Stat. Mech.	エントロピー	entropy	An extensive variable in thermodynamics which gives a measure of the microscopic disorder of a system.
14	Stat. Mech.	断熱膨張	adiabatic expansion	A thermodynamic expansion process in which no heat enters or leaves a system.
15	Stat. Mech.	分配関数	partition function	A summation which describes how the probabilities are divided among the different microstates, based on their individual energies: it counts the (weighted) number of states a system can occupy.
16	Stat. Mech.	熱平衡	thermal equilibrium	The condition of a system in which the net rate of exchange of heat between its components is zero.
17	Stat. Mech.	平均自由行程	mean free path	The average distance travelled between collisions by the molecules in a gas, photons in a plasma etc
18	Stat. Mech.	揺らぎ	fluctuation	An irregular increase or decrease in a quantity derived from many identical random processes.
19	Stat. Mech.	飽和	saturation	A situation in which the response or output of a system becomes substantially constant and independent of the increasing external field or input.
20	Stat. Mech.	ヒステリシス	hysteresis (*pl.* hystereses)	The dependence of a system not only on its current environment but also on its past environment, e.g. in a ferromagnetic material.
21	Stat. Mech.	アニーリング （焼きなまし）	annealing	The process of heating a substance at a certain temperature below its melting temperture, maintaining it for a cetain time, and cooling it slowly so that the substance reaches a state closer to its thermal equilibrium at ambient tempearatue.

	Category	単語	Words	Definitions/descriptions
1	Condensed Matter	金属	metal	A material with high electrical conductivity (low resistance).
2	Condensed Matter	絶縁体	insulator	A material with very low electrical conductivity (high resistance) because of the energy gap between the valence band and conduction band.
3	Condensed Matter	超伝導	superconductivity	A phenomenon in which the electrical resistance of a metal disappears completely below a certain temperature.
4	Condensed Matter	相転移	phase transition	The transformation of a thermodynamic system from one state of matter to another.
5	Condensed Matter	走査型トンネル顕微鏡	STM (scanning tunneling microscope)	A type of an electron microscope based on the tunnel effect for imaging surfaces at the atomic level. (When a fine conducting tip is held close to the surface of a sample with an electric potential, electrons tunnel between the sample and the tip, producing a small current. The tip is slowly moved across the surface and raised and lowered so as to keep the electrical current constant. In this way, the profile of the surface based on its local density of electron states can be
6	Condensed Matter	核磁気共鳴	NMR (nuclear magnetic resonance)	A resonant absorption of radio-frequency radiation when its frequency coincides with the difference in energy between two states of a nucleus with a spin in a magnetic field.
7	Condensed Matter	レーザー	Laser	A beam of coherent, monochromatic light, or a device that emits such a beam. The light is produced by stimulated emission of electromagnetic radiation.
8	Condensed Matter	発光ダイオード	LED (light-emitting diode)	A semiconductor pn-junction diode which emits light by recombination of electrons with holes. The color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor.
9	Particles and Cosmology	微細構造定数	fine-structure constant	A dimensionless quantity, denoted by α, which serves as a convenient measure of the strength of the electromagnetic interaction.
10	Particles and Cosmology	核融合	nuclear fusion	A reaction between light nuclei in which a heavier nucleus is formed with the release of energy.
11	Particles and Cosmology	核分裂	nuclear fission	The splitting of a heavy nucleus of an atom into two or more fragments of comparable size.
12	Particles and Cosmology	宇宙	universe	All the matter, energy and space that exists.
13	Particles and Cosmology	銀河	galaxy	A large gravitationally bound cluster of stars, gas, and dust.
14	Particles and Cosmology	太陽系	the solar system	The system made up of the sun, its orbiting planets and their natural satellites (moons).
15	Particles and Cosmology	宇宙線	cosmic ray	High-energy charged particles which enter the earth's atmosphere from outer space.
16	Particles and Cosmology	重力波	gravitational wave	Disturbance in the curvature of spacetime, generated by accelerated masses, that propagates as a wave outward from their source at the speed of light.
17	Particles and Cosmology	特殊相対論	the special theory of relativity	The theory developed by Einstein in 1905 which leads to the equivalence of energy and mass: $E = mc^2$.
18	Particles and Cosmology	一般相対論	general relativity (The general theory of relativity)	The theory developed by Einstein which provides a unified description of gravity as a geometric property of space and time, or spacetime. (In particular, the curvature of spacetime is directly related to the energy and momentum of whatever matter and radiation are present.)