PhysicsKIT 4STEM

# PHYSICSKIT GLOSSARY

## Dictionary-style glossary to help you with your PhysicsKIT

Schole

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# Introduction

Recent research has shown that gender inequality in STEM education has revealed the presence of a “leaky pipeline” (Yatskiv, 2017), meaning that women systemically drop out of STEM-related tracks at various levels of their education. The European Commission believes that without true gender equality and mainstreaming in science fields, scientific excellence would never be truly achieved. As a matter of fact, women are more likely to have a higher education degree but remain under-represented in STEM and related fields. At the same time, in an increasingly multidisciplinary world, young students have lost their interest in traditional subjects, such as physics, chemistry, biology, etc. are already considered obsolete (Briggs, 2016). However, science subjects should never be considered out-of-fashion since our world rotates around science. The issue is identified in teaching methods.

Therefore, the need for stimulating, engaging and gender-appealing teaching methods in STEM subjects is now more important than ever, a fact that should be initiated in secondary education where young students start to share their interests and inclines for their future education and careers.

**PhysicsKIT4STEM** has as primary **objective,** to strengthen the teaching skills of STEM educators by offering a hands-on approach to teach physics through DIY kits, electronics and programming, powered by a Raspberry Pi computer, while at the same time advocating gender-balanced STEM classrooms and encouraging young girls to science and engineering subjects.

We aim to elucidate findings regarding ways of introducing children to physics and STEM through hands-on play; create evidence-based policy and research recommendations for using educational play to teach STEM-related subjects; and act as a node of knowledge dissemination on how to engage young girls to physics and STEM in general.

The document in hands is part of the **O1A2 - PhysicsKIT Glossary & Online Repository,** which aims at the creation of a **glossary** explaining terms, keywords and expressions that are used in physics, electronics, programming, physical computing, but also in developing and building constructs. The glossary will include terms from the modules of the curriculum, technical terms for assembly and configuration, explanation of components, sensors, electronics, etc., and other relevant concepts. The intention is to have a compact list of keywords commonly used in areas relevant to the project together with a simplified explanation or definition, suitable for children in the target group.

This dictionary-style **glossary**, is a complement to the developed curriculum, containing all necessary terms, definitions, keywords and expressions for physics, programming, physical computing, electronics, sensors, and other components, all defined and explained in simple words so young children/pupils can easily adopt the new vocabulary

and are able to recollect them during the course that will be used in the PhysicsKIT4STEM project

The current glossary is a compilation of all the glossaries present at the modules created by each partner for **O1A1 - PhysicsKIT Curriculum Design & Development**, about electricity & magnetism; conservation of energy & momentum; motions & forces; gravity; waves, the terms and concepts present at the Assembly Guide for the PhysicsKIT4STEM.

# General Glossary

| Number | Term | Definition |
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| **1** | 3V-6V Small DC Motor | Electrical motors that convert direct current electrical energy into mechanical energy. |
| **2** | 4pin Magnetic Reed Switch Module | A reed switch is a type of line switch component that realizes control by magnetic signals. When a magnetic substance approaches, the switch senses the magnetic force and is electrified; thus, the module outputs a low level. When there is not a magnet approach, the module is de-energized and will output high. |
| **3** | Acceleration | The rate at which the velocity of an object changes with respect to time (per unit of time). |
| **4** | Accelerometer ADXL345 | Is a low-power, 3-axis MEMS accelerometer modules with both I2C and SPI interfaces |
| **5** | Actuator | An actuator is a device that transforms the energy provided to it into a physical phenomenon that provides work, alters the behavior or condition of a system. |
| **6** | Amplitude | The maximum amount of displacement is known as amplitude. It is usually symbolized using the capital letter A. It can be measured by calculating the change in value from the point of equilibrium and the peak of the wave. In sound waves, the higher the amplitude, the higher the loudness and therefore the louder the music. |
| **7** | Anion | An Anion is an ion that, having gained one or more electrons, carries one or more negative elemental electrical charge: for example, the Cl chloride ion$^-$ is the chlorine atom that has gained an electron. |
| **8** | Applied force | A force applied to an object or being. |
| **9** | Arduino | Is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices. |
| **10** | Atom | An atom is the smallest part of a single body that can chemically combine with another. Atoms are the elementary constituents of all solid, liquid, or gaseous substances. |
| **11** | Battery life | Battery life is a measure of battery performance and longevity, which can be quantified in several ways: as run time on a full charge, as estimated by a |

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| | | manufacturer in milliampere hours, or as the number of charge cycles until the end of useful life. |
| **12** | Binary form | A binary file is a computer file that is not a text file. The term "binary file" is often used as a term meaning "non-text file". Many binary file formats contain parts that can be interpreted as text; for example, some computer document files containing formatted text, contain the text of the document but also contain formatting information in binary form. |
| **13** | Bluetooth | Bluetooth is a communication standard that allows two-way data exchange at short distances using UHF radio waves on the 2.4 GHz frequency band. Its goal is to simplify connections between nearby electronic devices by removing wired links. |
| **14** | Bolts | A bolt is a form of threaded fastener with an external male thread requiring a matching pre-formed female thread such as a nut. Bolts are very closely related to screws. |
| **15** | Breadboards | A breadboard, or protoboard, is a construction base for prototyping of electronics. Originally the word referred to a literal bread board, a polished piece of wood used when slicing bread. In the 1970s the solderless breadboard (a.k.a. plugboard, a terminal array board) became available and nowadays the term "breadboard" is commonly used to refer to these. |
| **16** | C (programming language) | C is a general-purpose, procedural computer programming language supporting structured programming, lexical variable scope, and recursion, with a static type of system. By design, C provides constructs that map efficiently to typical machine instructions. It has found lasting use in applications previously coded in assembly language. Such applications include operating systems and various application software for computer architectures that range from supercomputers to PLCs and embedded systems. |
| **17** | Cables | An electrical cable is an assembly of one or more wires running side by side or bundled, which is used to carry electric current. |
| **18** | Card reader | An electronic sensor that reads a magnetic strip or bar code on a credit card, membership card, etc. and transfers data from various portable memory storage devices. |
| **19** | Cation | A cation is an ion that, having lost one or more electrons, carries one or more positive electrical |

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| | | charge: conversely, an anion contains more electrons than protons. |
| **20** | Chemical energy | Energy stored in the bonds of chemical compounds like atoms and molecules |
| **21** | Chromium | Chromium is a free and open-source codebase for a web browser, principally developed and maintained by Google. Google uses the code to make its Chrome web browser, which has additional features. The Chromium codebase is widely used. |
| **22** | Circuits | An electric circuit includes a device that gives energy to the charged particles constituting the current, such as a battery or a generator; devices that use current, such as lamps, electric motors, or computers; and the connecting wires or transmission lines. |
| **23** | Computing | Computing is any goal-oriented activity requiring, benefiting from, or creating computing machinery. It includes the study and experimentation of algorithmic processes and development of both hardware and software. It has scientific, engineering, mathematical, technological, and social aspects. Major computing disciplines include computer engineering, computer science, cybersecurity, data science, information systems, information technology and software engineering. |
| **24** | Configuration | To "configure software" means selecting programmable options that make the program function to the user's liking. To "configure hardware" means assembling desired components for a custom system as well as selecting options in the user-programmable parts of the system. |
| **25** | Conservative forces | If the force required to move an object between 2 points, whatever the path chosen, remains the same, it is said to be a conservative force |
| **26** | Data | Facts or information used usually to calculate, analyze, or plan something, information that is produced or stored by a computer. |
| **27** | Debian-based operating system | Debian, also known as Debian GNU/Linux, is a Linux distribution composed of free and open-source software, developed by the community-supported Debian Project, which was established by Ian Murdock on August 16, 1993. Debian is one of the oldest operating systems based on the Linux kernel. |
| **28** | Desktop | A desktop computer is a personal computer designed for regular use at a single location on or near a desk due to its size and power requirements. |

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| | | The most common configuration has a case that houses the power supply, motherboard (a printed circuit board with a microprocessor as the central processing unit, memory, bus, certain peripherals, and other electronic components), disk storage (usually one or more hard disk drives, solid state drives, optical disc drives, and in early models a floppy disk drive); a keyboard and mouse for input; and a computer monitor, speakers, and, often, a printer for output. The desktop also refers to the main screen area that you see after you turn on your computer and log on to Windows. Like the top of an actual desk, it serves as a surface for your work. The desktop is sometimes defined more broadly to include the taskbar and Windows Sidebar. The taskbar sits at the bottom of your screen. |
| **29** | DHT11 Digital Temperature and Humidity Sensor | A humidity sensor (or hygrometer) senses, measures, and reports both moisture and air temperature. The ratio of moisture in the air to the highest amount of moisture at a particular air temperature is called relative humidity. |
| **30** | Digital temperature sensor | A digital temperature is a sensor, which provides 9-bit temperature readings. Digital temperature sensors offer excellent precise accuracy, these are designed to read from 0°C to 70°C and it is possible to achieve ±0.5°C accuracy. These sensors completely aligned with digital temperature readings in degrees Celsius. |
| **31** | Displays | A display device is an output device for presentation of information in visual or tactile form (the latter used for example in tactile electronic displays for blind people). When the input information that is supplied has an electrical signal the display is called an electronic display.<br>Common applications for electronic visual displays are television sets or computer monitors. |
| **32** | Elastic potential energy | Energy produced by the deformation of an elastic object which restores its initial shape after the energy has been released |
| **33** | Electrical energy | Electrical energy is the power an atom's charged particles have to cause an action or move an object. The movement of electrons from one atom to another is what results in electrical energy. Every time you plug a toaster or cellphone charger into a wall outlet, electrical energy is powering those devices. |

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| **34** | Electrical potential energy | Energy produced by the arrangement and the motion of charges in electrical and magnetic fields |
| **35** | Electron hole | In physics, chemistry, and electronic engineering, an electron hole (often simply called a hole) is the lack of an electron at a position where one could exist in an atom or atomic lattice. Holes are not actually particles, but rather quasiparticles; they are different from the positron, which is the antiparticle of the electron |
| **36** | Energy | Capacity for doing work or to change the state of a system |
| **37** | Ethernet cable | An Ethernet cable is a very popular type of network cable which is used for wired networks (a network type which connects devices to the Internet or other networks using cables). They are used to connect devices located on local area networks (LANs), such as routers, PCs, and switches. |
| **38** | Fibonacci Series | The Fibonacci Sequence is a peculiar series of numbers from classical mathematics that has found applications in advanced mathematics, nature, statistics, computer science, and Agile Development. The Fibonacci sequence is a series of numbers where a number is the addition of the last two numbers, starting with 0, and 1.<br>The Fibonacci Sequence: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, (…) |
| **39** | Fission | If a massive nucleus becomes unstable, the nucleus will split into pieces to gain stability |
| **40** | Flame Sensor | A flame detector is a sensor designed to detect and respond to the presence of a flame or fire, allowing flame detection. |
| **41** | Force | A push or pull action. |
| **42** | Force centrifugal | Centrifugal force, the common but "abusive" name for the centrifugal effect, is a particular case of fictitious force that appears in physics in the context of the study of the movement of objects in non-inertial repositories. The effect felt is due to the rotational movements of these repositories and results in a tendency to move the bodies away from the center of rotation. This is, for example, the ejection sensation of a traveler in a vehicle that makes a turn. |
| **43** | Frequency | The amount of time it takes for one oscillation to occur is known as the frequency of the wave. Frequency (f) is measured using hertz (Hz), which translates to the wave's rate (how many waves per |

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| | | unit time). Frequency is also known as the number of oscillations per unit time (waves per second). |
| **44** | Friction | A force produced when two objects rub against each other. |
| **45** | Frictional force | The force caused by friction. |
| **46** | Fusion | If a light nucleus is unstable, nuclei will be gathered to gain stability |
| **47** | Glue language | Glue language refers to a programming language that is designed specifically to write and manage program and code, which connects different software components. |
| **48** | GPIO (general-purpose input/output) pins | A general-purpose input/output (GPIO) is an uncommitted digital signal pin on an integrated circuit or electronic circuit board which may be used as an input or output, or both, and is controllable by the user at runtime. GPIOs have no predefined purpose and are unused by default. A GPIO pin is a generic pin whose value consists of one of two voltage settings (high or low) and whose behavior can be programmed through software. A GPIO port is a platform-defined grouping of GPIO pins (often 4 or more pins) |
| **49** | Gravitational force | The force of attraction between every mass in the universe; it is the name given to the attraction of our planet's mass for bodies that are close to its surface |
| **50** | Gravitational potential energy | Capacity to produce work depending on the position of the object into the gravitational fields |
| **51** | Gravity | The force of attraction that causes bodies to be drawn to each other and pulls objects towards the Earth's core. |
| **52** | Gravity center | It's an imaginary point where, by convenience, the weight of the body may be concentrated. |
| **53** | Handles | The part by which a thing is held, carried, or controlled. |
| **54** | Hardware | Computer hardware includes the physical parts of a computer, such as the case, central processing unit (CPU), monitor, mouse, keyboard, computer data storage, graphics card, sound card, speakers, and motherboard. |
| **55** | HC-SR04 Ultrasonic Sensor | As the name indicates, ultrasonic / level sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected from the target. ultrasonic / level sensors measure the distance to the target by measuring the time between the emission and reception. |

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| **56** | HDMI port | HDMI stands for High-Definition Multimedia Interface and is the most frequently used HD signal for transferring both high-definition audio and video over a single cable. |
| **57** | High Sensitivity Sound Detection Sensor | A sound sensor is defined as a module that detects sound waves through its intensity and converting it to electrical signals. |
| **58** | Hinges | A movable joint or mechanism on which a door, gate, or lid swing as it opens and closes, or which connects linked objects. |
| **59** | Humidity | Humidity is the amount of water vapor in the air. Relative humidity is the amount of water vapor in the air, expressed as a percentage of the maximum amount of water vapor the air can hold at the same temperature. |
| **60** | Incandescent Lamp | The incandescent lamp is an electric light fixture that illuminates by incandescently bearing a tungsten filament, the metal that has the highest melting point. |
| **61** | Inertia | Inertia is a property of all objects that have mass. If an object is moving, then inertia helps it to stay moving and if an object is motionless, then inertia helps it to stay motionless. |
| **62** | Infrared | Infrared (IR), sometimes called infrared light, is electromagnetic radiation (EMR) with wavelengths longer than those of visible light. It is therefore invisible to the human eye. IR is generally understood to encompass wavelengths from the nominal red edge of the visible spectrum around 700 nanometers (frequency 430 THz), to 1 millimeter (300 GHz) (although the longer IR wavelengths are often designated rather as terahertz radiation). Black-body radiation from objects near room temperature is almost all at infrared wavelengths. As a form of electromagnetic radiation, IR propagates energy and momentum, with properties corresponding to both those of a wave and of a particle, the photon. |
| **63** | Infrared IR Receiver Sensor Module KY-022 | An infrared receiver, or IR receiver, is hardware that sends information from an infrared remote control to another device by receiving and decoding signals. In general, the receiver outputs a code to uniquely identify the infrared signal that it receives. |
| **64** | Infrared signals | One of the most useful applications of the IR spectrum is in sensing and detection. All objects on Earth emit IR radiation in the form of heat. This can be detected by electronic sensors, such as those used in night vision goggles and infrared cameras. |

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| **65** | Installation | Installation (or setup) of a computer program (including device drivers and plugins), is the act of making the program ready for execution. Installation refers to the configuration of a software or hardware with a view to making it usable with the computer. |
| **66** | Internet | The Internet (or internet) is the global system of interconnected computer networks that uses the Internet protocol suite (TCP/IP) to communicate between networks and devices. It is a network of networks that consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies. The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), electronic mail, telephony, and file sharing. |
| **67** | Inventory | Inventory refers to all the items, goods, merchandise, and materials held by a business for selling in the market to earn a profit. |
| **68** | Isaac Newton | An English mathematician who originated the theory of forces. |
| **69** | Java | Java is a high-level, class-based, object-oriented programming language that is designed to have as few implementation dependencies as possible. It is a general-purpose programming language intended to let application developers write once, run anywhere (WORA), meaning that compiled Java code can run on all platforms that support Java without the need for recompilation. Java applications are typically compiled to bytecode that can run on any Java virtual machine (JVM) regardless of the underlying computer architecture. The syntax of Java is similar to C and C++ but has fewer low-level facilities than either of them. The Java runtime provides dynamic capabilities (such as reflection and runtime code modification) that are typically not available in traditional compiled languages. |
| **70** | Joule | Unit of energy in the international system, named after the English physicist James Prescott Joule. A Joule equals the energy needed to use a Newton of force to move to one meter an object. |
| **71** | Jumper Cables | A jump wire (also known as jumper, jumper wire, jumper cable, DuPont wire or cable) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – |

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| | | simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering. Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment. |
| **72** | Keyboard | A keyboard is for putting information including letters, words, and numbers into your computer. You press the individual buttons on the keyboard when you type. The number keys across the top of the keyboard are also found on the right of the keyboard. The letter keys are in the center of the keyboard. |
| **73** | Kinetic energy | Macroscopic and organized energy based on a mass in movement |
| **74** | KY-005 38KHz Infrared IR Transmitter Sensor | An IR sensor consists of an IR LED and an IR Photodiode; together they are called as Photo – Coupler or Opto – Coupler. When the IR transmitter emits radiation, it reaches the object and some of the radiation reflects to the IR receiver. |
| **75** | L293D Control IC Chip | A control integrated circuit (IC) is a set of circuits constructed on a single semiconductor, wafer, or chip. Control ICs are motion processors on a semiconductor, wafer, or chip that control multiple devices. |
| **76** | Laptop | A computer that is portable and suitable for use while travelling. |
| **77** | LEDs | A light-emitting diode (LED) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device. |
| **78** | Library | A library is a collection of materials, books or media that are easily accessible for use and not just for display purposes. It is responsible for housing updated information to meet the user's needs on a daily basis. A Library provides physical (hard copies documents) or digital access (soft copies) materials and may be a physical location or a virtual space, or both. |

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| **79** | Lids | A removable or hinged cover for the top of a container |
| **80** | Light intensity | Luminous intensity, the quantity of visible light that is emitted in unit time per unit solid angle. The unit for the quantity of light flowing from a source in any one second (the luminous power, or luminous flux) is called the lumen. The lumen is evaluated with reference to visual sensation. |
| **81** | Light resistance | The ability of a material, such as a plastic, to resist fading after exposure to sunlight or ultraviolet light. |
| **82** | Linear Magnetic Hall Sensor | Hall sensors are linear transducers. Such sensors require a linear circuit for processing the sensor output signal. This circuit provides the drive voltage for the sensor and is used to amplify the output signal. Hall sensors with linear transducers are commonly integrated with digital electronics |
| **83** | Linux | Linux or GNU/Linux is a family of Unix-type open-source operating systems based on the Linux kernel, created in 1991 by Linus Torvalds. Many Linux distributions have since emerged and are an important vehicle for popularizing the free software movement. |
| **84** | LXDE desktop environment | LXDE (abbreviation for Lightweight X11 Desktop Environment) is a free desktop environment with comparatively low resource requirements. This makes it especially suitable for use on older or resource-constrained personal computers such as netbooks or system on a chip compute |
| **85** | MacOS | macOS (previously Mac OS X and later OS X) is a proprietary graphical operating system developed and marketed by Apple Inc. since 2001. It is the primary operating system for Apple's Mac computers. Within the market of desktop, laptop, and home computers, and by web usage, it is the second most widely used desktop OS, after Windows NT. |
| **86** | Magnetic field | The magnetic field is the area around a magnet in which there is magnetic force. Moving electric charges can make magnetic fields. In physics, the magnetic field is a field that passes through space, and which makes a magnetic force move electric charges and magnetic dipoles. |
| **87** | Magnetic force | The force created by a magnet. |
| **88** | Magnetic sensor | Magnetic sensors detect moving ferrous metal. The simplest magnetic sensor consists of a wire coiled around a permanent magnet. A ferrous object approaching the sensor changes magnetic flux |

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| | | through the coil, generating a voltage at the coil terminals. Magnetic sensors measure speeds up to 600,000 rpm. |
| **89** | Makers | A person who makes (something); fabricator; constructor. |
| **90** | Mass | The amount of matter in an object. |
| **91** | Mathematica (software/program) | Mathematica is a symbolic mathematical computation program, sometimes called a computer algebra program, used in many scientific, engineering, mathematical, and computing fields. It was conceived by Stephen Wolfram and is developed by Wolfram Research of Champaign, Illinois. |
| **92** | Mechanical energy | Energy based on motion involving an object with or without a mass |
| **93** | Micro SD card | A type of very small memory card typically used in mobile phones and other portable devices. |
| **94** | Microcontroller | A microcontroller is a computer present in a single integrated circuit which is dedicated to perform one task and execute one specific application. It contains memory, programmable input/output peripherals as well a processor. |
| **95** | Microprocessor | A microprocessor is a processor whose components have been miniaturized enough to be grouped into a single case. Functionally, the processor is the part of a computer that executes instructions and processes program data. |
| **96** | Minecraft | Minecraft is a sandbox video game developed by the Swedish video game developer Mojang Studios. The game was created by Markus ""Notch"" Persson in the Java programming language.<br>In Minecraft, players explore a blocky, procedurally generated 3D world with virtually infinite terrain, and may discover and extract raw materials, craft tools and items, and build structures or earthworks. Depending on game mode, players can fight computer-controlled mobs, as well as cooperate with or compete against other players in the same world. Game modes include a survival mode, in which players must acquire resources to build the world and maintain health, and a creative mode, where players have unlimited resources and access to flight. Players can modify the game to create new gameplay mechanics, items, and assets.<br>Minecraft has also been used in educational environments, especially in the realm of computing |

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| | | systems, as virtual computers and hardware devices have been built in it. |
| **97** | Minecraft Pi | Minecraft Pi is a version of Minecraft, with minimal features, developed for Raspberry Pi. Pi edition is intended as an educational tool for novice programmers, allowing users to enjoy the game and learn programming at the same time. |
| **98** | Mobile device | A mobile device (or handheld computer) is a computer small enough to hold and operate in the hand. Typically, any handheld computer device will have an LCD or OLED flatscreen interface, providing a touchscreen interface with digital buttons and keyboard or physical buttons along with a physical keyboard. Many such devices can connect to the Internet and interconnect with other devices such as car entertainment systems or headsets via Wi-Fi, Bluetooth, cellular networks or near field communication (NFC). Integrated cameras, the ability to place and receive voice and video telephone calls, video games, and Global Positioning System (GPS) capabilities are common. Power is typically provided by a lithium-ion battery. Mobile devices may run mobile operating systems that allow third-party apps specialized for said capabilities to be installed and run. |
| **99** | Moisture | Moisture is the presence of a liquid, especially water, often in trace amounts. Small amounts of water may be found, for example, in the air (humidity), in foods, and in some commercial products. Moisture also refers to the amount of water vapor present in the air. |
| **100** | Momentum | Property acquired by an object moving. All objects have mass. Which means that whenever an object moves it gains momentum. This is called mass in motion. |
| **101** | Motion | The changing of location or position of an object. |
| **102** | Motors | One that imparts motion specifically as a prime mover or any of various power units that develop energy or impart motion, such as: a small compact engine; internal combustion engine, especially a gasoline engine; a rotating machine that transforms electrical energy into mechanical energy. |
| **103** | Mouse | A small handheld device which is moved across a mat or flat surface to move the cursor on a computer screen. |
| **104** | MQ-135 Air Quality Sensor - Hazardous Gas Detection | Gas sensors (also known as gas detectors) are electronic devices that detect and identify different |

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| | | types of gasses. They are commonly used to detect toxic or explosive gasses and measure gas concentration. |
| **105** | Newton | The SI unit of force |
| **106** | Non-conservative forces | Forces that turn work into heat, sound, or light. Then at a macroscopic level, mechanical energy seems lost or non-conservative |
| **107** | Normal force | The force applied to an object that supports other objects, such as a glass on a kitchen counter. |
| **108** | Nuclear energy | Energy stored inside the nuclei of atoms. |
| **109** | Nuts | A nut is a fastener that consists of a block with a threaded hole in the center. The hole contains 'female' threads that typically correspond to the 'male' threads of a bolt or screw. Nuts are used with their 'mating' bolt or screw to fasten materials together. |
| **110** | Openbox stacking window manager | Openbox is a free, stacking window manager for the X Window System, licensed under the GNU General Public License. Originally derived from Blackbox 0.65. Openbox is designed to be small, fast, and fully compliant with the Inter-Client Communication Conventions Manual (ICCCM) and Extended Window Manager Hints (EWMH). |
| **111** | Opposing forces | These are forces which work against each other. |
| **112** | Oscillation | A complete oscillation occurs when a wave begins from its rest position and then returns to it. The time for one oscillation is referred to as the Period (T). The period and frequency are reciprocal of each other. |
| **113** | Peripherals | Peripheral device, also known as peripheral, computer peripheral, input-output device, or input/output device, any of various devices (including sensors) used to enter information and instructions into a computer for storage or processing and to deliver the processed data to a human operator or, in some cases, a machine controlled by the computer. Such devices make up the peripheral equipment of modern digital computer systems.<br>Peripherals are commonly divided into three kinds: input devices, output devices, and storage devices (which partake of the characteristics of the first two). An input device converts incoming data and instructions into a pattern of electrical signals in binary code that are comprehensible to a digital computer. An output device reverses the process, |

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| | | translating the digitized signals into a form intelligible to the user. |
| **114** | Philips screwdriver | A screwdriver that is designed to be used with a type of screw (called a Phillips-head screw) that has a slot in its top that looks like a cross. |
| **115** | Photodiode | A photodiode is a semiconductor p-n junction device that converts light into an electrical current.[1] The current is generated when photons are absorbed in the photodiode. Photodiodes may contain optical filters, built-in lenses, and may have large or small surface areas. Photodiodes usually have a slower response time as their surface area increases. The common, traditional solar cell used to generate electric solar power is a large area photodiode. |
| **116** | Photoresistor - Light Detection | A photocell or photoresistor is a sensor that changes its resistance when light shines on it. The resistance generated varies depending on the light striking at his surface. A high intensity of light incident on the surface will cause a lower resistance, whereas a lower intensity of light will cause higher resistance. |
| **117** | PIR Motion Detector Sensor HC-SR501 | PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors. |
| **118** | PIXEL, Pi Improved X-Window Environment, Lightweight | PIXEL (which is a clunky backronym for Pi Improved Xwindows Environment, Lightweight) is an extensively modified version of the LXDE X11 desktop environment. |
| **119** | Plexiglass | A transparent acrylic plastic often used in place of glass. |
| **120** | Potential energy | When stored energy which has a potential to do work is suspended (until the energy is released) |
| **121** | Potentiometer | A potentiometer is a three-terminal resistor with a sliding or rotating contact that forms an adjustable voltage divider. If only two terminals are used, one end and the wiper, it acts as a variable resistor or rheostat.<br>The measuring instrument called a potentiometer is essentially a voltage divider used for measuring electric potential (voltage); the component is an implementation of the same principle, hence its name.<br>Potentiometers are commonly used to control electrical devices such as volume controls on audio equipment. Potentiometers operated by a |

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| | | mechanism can be used as position transducers, for example, in a joystick. Potentiometers are rarely used to directly control significant power (more than a watt), since the power dissipated in the potentiometer would be comparable to the power in the controlled load. |
| **122** | Power Bank | A portable device that can store electricity for charging phones, cameras, laptop computers, etc. |
| **123** | Power supply | A power supply is an electrical device that supplies electric power to an electrical load. The primary function of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load. As a result, power supplies are sometimes referred to as electric power converters. Some power supplies are separate standalone pieces of equipment, while others are built into the load appliances that they power. Examples of the latter include power supplies found in desktop computers and consumer electronics devices. Other functions that power supplies may perform include limiting the current drawn by the load to safe levels, shutting off the current in the event of an electrical fault, power conditioning to prevent electronic noise or voltage surges on the input from reaching the load, power-factor correction, and storing energy so it can continue to power the load in the event of a temporary interruption in the source power (uninterruptible power supply). |
| **124** | Program /programming | Computer programming is the process of designing and building an executable computer program to accomplish a specific computing result or to perform a specific task. Programming involves tasks such as: analysis, generating algorithms, profiling algorithms' accuracy and resource consumption, and the implementation of algorithms in a chosen programming language (commonly referred to as coding). The source code of a program is written in one or more languages that are intelligible to programmers, rather than machine code, which is directly executed by the central processing unit. The purpose of programming is to find a sequence of instructions that will automate the performance of a task (which can be as complex as an operating system) on a computer, often for solving a given problem. Proficient programming thus often requires expertise in several different subjects, including |

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| | | knowledge of the application domain, specialized algorithms, and formal logic. |
| **125** | Proton | The proton is a subatomic particle with a positive elementary electrical charge. Protons are present in atomic nuclei, usually linked to neutrons by the strong interaction. |
| **126** | Python | Python is an interpreted, object-oriented, high-level programming language. Python has simple, easy to learn syntax that emphasizes readability and therefore reduces the overall time needed to learn it and to develop and maintain a program. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms and can be freely distributed. |
| **127** | Radiant energy | Microscopic and organized energy based on wave movement without involving mass |
| **128** | Rapid Application Development | Rapid application development (RAD) is an agile project management strategy popular in software development. The key benefit of a RAD approach is fast project turnaround, making it an attractive choice for developers working in a fast-paced environment like software development. |
| **129** | Raspberry Pi | Raspberry Pi is a credit card sized, fully functional computer which operates on Raspberry Pi OS. |
| **130** | Raspberry Pi GPIO | Raspberry Pi GPIO is the row of pins along the top edge of the board. A 40-pin header is found on all current Raspberry Pi boards. Most of the functionality of the Raspberry Pi comes from these pins which can be configured and controlled using a programming language. Any of the GPIO pins can be designated in software as an input or output pin and used for a wide range of purposes such as to control LEDs, buzzers, motors, servos, to interact with sensors, to communicate with other devices, etc. |
| **131** | Raspberry Pi OS | The operating system for Raspberry Pi. |
| **132** | Reboot | The act or an instance of shutting down and restarting something (such as a computer or program) In a few cases, errors cause a headlong exit to DOS or the software ceases to operate, requiring a reboot. |
| **133** | Reflection | When a wave hits an object, it cannot pass through, it is reflected on the object's surface. The angle at which the wave hits the barrier is calculated at 90o from the objects surface from the direction the wave |

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| | | came from, and it is called the angle of incidence (i). When the wave is reflected, it is reflected at an angle with the same measure as the angle of incidence and it is known as the angle of reflection (r). |
| **134** | Refraction | Waves that enter an object undergo what is called refraction. Refraction is simply the change of direction at which the wave is travelling when it enters a medium. However, the speed of the wave might also be affected as the wavelength of the wave might increase or decrease depending on the medium at which is travelling. The faster the wave is travelling, the bigger the wavelength, but if the wave is slowed down, its wavelength will decrease. |
| **135** | Resisting force | A force that changes the state of motion of an object, by either making it move slower or by stopping it completely. |
| **136** | Resistors | A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. |
| **137** | Rotary Encoder Module Brick Sensor KY-040 | Encoder sensors are a type of mechanical motion sensor that create a digital signal from a motion. It is an electro-mechanical device that provides users (commonly those in a motion control capacity) with information on position, velocity, and direction. |
| **138** | Scratch | Scratch is a visual programming language that allows students to create their own interactive stories, games, and animations. As students design Scratch projects, they learn to think creatively, reason systematically, and work collaboratively. |
| **139** | Screws | A short, slender, sharp-pointed metal pin with a raised helical thread running round it and a slotted head, used to join things together by being rotated so that it pierces wood or other material and is held tightly in place. |
| **140** | Scripting | Scripting language (also known as scripting, or script) is a series of commands that are able to be executed without the need for compiling. While all scripting languages are programming languages, not all programming languages are scripting languages. PHP, Perl, and Python are common examples of scripting languages. |
| **141** | Sensitivity | Sensitivity in electronics, is the minimum magnitude of input signal required to produce a specified output signal. |

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| **142** | Sensor | A sensor is a device that measures physical input from its environment and converts it into data that can be interpreted by either a human or a machine (transforms the state of an observed physical size into a usable size). Most sensors are electronic (the data is converted into electronic data), but some are simpler, such as a glass thermometer, which presents visual data. (e. g. electrical voltage, a height of mercury, an intensity or the deviation of a needle) |
| **143** | SG90 Micro Servo Motor | A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. |
| **144** | Slot | A long, narrow aperture or slit in a machine for something to be inserted. |
| **145** | Software | Software is a collection of instructions and data that tell a computer how to work. This contrasts with physical hardware, from which the system is built and actually performs the work. In computer science and software engineering, computer software is all information processed by computer systems, including programs and data. Computer software includes computer programs, libraries and related non-executable data, such as online documentation or digital media. Computer hardware and software require each other and neither can be realistically used on its own. |
| **146** | Soil Hygrometer / Moisture Detection Sensor | The Soil Moisture Sensor is used to measure the volumetric water content of soil. This makes it ideal for performing experiments in courses such as soil science, agricultural science, environmental science, horticulture, botany, and biology. |
| **147** | Sound | Microscopic and organized energy based on wave movement involving mass |
| **148** | Source | Anything or place from which something comes, arises, or is obtained, origin. |
| **149** | Speed of light | The speed of light in vacuum, commonly denoted c, is a universal physical constant and its exact value is defined as 299 792 458 m/s. |
| **150** | Spreadsheets | The definition of a spreadsheet is a piece of paper, or a computer program used for accounting and recording data using rows and columns into which information can be entered. |
| **151** | Spring force | Elastic force, created by a spring |

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| **152** | Storage | Storage is a process through which digital data is saved within a data storage device by means of computing technology. Storage is a mechanism that enables a computer to retain data, either temporarily or permanently. Storage may also be referred to as computer data storage or electronic data storage. |
| **153** | Strong electromagnetic interference | Electromagnetic interference (EMI) is a phenomenon that may occur when an electronic device is exposed to an electromagnetic (EM) field. Any device that has electronic circuitry can be susceptible to EMI. |
| **154** | SW-420 Vibration - Motion Sensor | A vibration sensor is a device that measures the amount and frequency of vibration in a given system, machine, or piece of equipment. |
| **155** | Syntax | Syntax refers to the rules that define the structure of a language. Syntax in computer programming means the rules that control the structure of the symbols, punctuation, and words of a programming language. |
| **156** | Temperature | Temperature is the measure of hotness or coldness expressed in terms of any of several scales, including Fahrenheit and Celsius. Temperature indicates the direction in which heat energy will spontaneously flow—i.e., from a hotter body (one at a higher temperature) to a colder body (one at a lower temperature). |
| **157** | Tension force | Tension force is the force applied to cables or wires that are anchored on opposite ends to opposing walls or other objects. |
| **158** | Terminal window | In a remote-control operation, a terminal window displays the screen of the remote machine it is controlling. For local or remote execution of a program, it is a window in a graphical interface that is used to display a command line. |
| **159** | Thermal energy (heat) | Microscopic and disorganized energy based on a mass in movement |
| **160** | Thermistor | A thermistor is a type of resistor whose resistance is strongly dependent on temperature, more so than in standard resistors. Thermistors are widely used as inrush current limiters, temperature sensors (negative temperature coefficient or NTC type typically), self-resetting overcurrent protectors, and self-regulating heating elements (positive temperature coefficient or PTC type typically). An operational temperature range of a thermistor is dependent on the probe type and is typically in between −100 °C (173 K) and 300 °C (573 K). |

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| **161** | Thermocouple | A thermocouple, or thermo-electric couple, is, in physics, a couple of materials whose Seebeck effect, discovered in 1821 by the German physicist Thomas Johann Seebeck, is used for measuring temperature |
| **162** | Thonny Python | Thonny is an integrated development environment for Python that is designed for beginners. It supports different ways of stepping through the code, step-by-step expression evaluation, detailed visualization of the call stack and a mode for explaining the concepts of references and heap. |
| **163** | Tinkerers | To repair, adjust, or work with something in an unskilled or experimental manner; to repair, adjust, or experiment with. |
| **164** | TMP36 Temperature Sensor | A temperature sensor is a device used to measure temperature. This can be air temperature, liquid temperature, or the temperature of solid matter. There are different types of temperature sensors available, and they each use different technologies and principles to take the temperature measurement |
| **165** | Transfer (of energy) | When the same type of energy goes through multiple systems (like a chain reaction) |
| **166** | Transformation (of energy) | When the energy changes its form to go through multiple systems (like a chain reaction) |
| **167** | Ultrasonic | Inaudible sound with high frequency for human. The frequency of which generally exceeds 20 kHz. These days, sound wave which is not intended to be heard is also called ultrasonic wave. |
| **168** | USB charger | A USB network has a host and a device. The host is usually either a PC or a power module that allows charging directly from the power supply. USBs transfer both data and power. |
| **169** | USB ports | Universal Serial Bus is a hardware interface that supports up to 127 peripherals. USB is used to attach keyboards, mice, printers, external storage and mobile devices to the computer. It is also used for charging a wide variety of portable products - USB power. |
| **170** | Velocity | Velocity is the speed an object has at a certain direction. If an object changes direction, then its velocity changes as well since it is not moving in its original direction. |
| **171** | Vibration waves | Vibrations in objects and substances are oscillating motions that occur repeatedly over a fixed position. Vibrations are the origins of waves. When vibrations disturb a medium, the disturbance travels through |

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| | | the medium, from one location to another, in the form of a wave. |
| **172** | Volume | The amount of space that an object or substance takes up |
| **173** | Wall outlet | A device to which a piece of electrical equipment can be connected in order to provide it with electricity. |
| **174** | Wavelength | The wavelength as the name suggests is the length of one full wave. It is the distance between two consecutive crests or trough. To calculate the value of half a wavelength it would be the distance between a crest and the next available through or vice versa. It is symbolized using the Greek letter lambda (λ). |
| **175** | Waves | Waves are a form of disturbance that travels from one location to another. They transfer energy and information, but without transferring matter. |
| **176** | Weight | Is a measure of the force of gravity pulling on an object |
| **177** | Wi-Fi Network | A Wi-Fi network is simply an internet connection that's shared with multiple devices in a home or business via a wireless router. The router is connected directly to your internet modem and acts as a hub to broadcast the internet signal to all your Wi-Fi enabled devices. |
| **178** | Windows | Windows is a graphical operating system developed by Microsoft. It allows users to view and store files, run the software, play games, watch videos, and provides a way to connect to the internet. |
| **179** | Word-processing | Word Processing refers to the act of using a computer to create, edit, save, and print documents. Text can be inserted, edited, moved, copied, or deleted within your document and the appearance of the text can be modified in numerous ways. |