Physics

Select Measuring Instruments

1.	Hydrometer	Measuring the density or relative density of liquids. Based on floatation principle.
2.	Magnetron	Produces microwave. Used in ovens.
3.	Actinometer	Used to measure intensity of electromagnetic radiation
4.	Altimeter	Aneroid barometer for measuring altitude.
5.	Bolometer	For measuring heat radiation
6.	Dasymeter	Measuring density of gas
7.	Galvanometer	Used for detecting small electric currents.
8.	Gyroscope	Determine orientation in aircraft, ships etc.
9.	Katharometer	Measuring thermal conductivity
10.	Manometer	Measuring the pressure of a gas.
11.	Nethoscope	Determining the speed of celestial bodies.
12.	Rectifier	Converts AC into DC.
13.	Tonometer	Measures pitch of sound
14.	Venturimeter	Measures rate of flow of fluids
15.	Udometer	Rain guage.

Standard Units

1.	Viscocity	Pascal Second
2.	Power	Dioptre
3.	Luminous intensity	Candela
4.	Inductance	Henry
5.	Loudness	Phon
6.	Magnetic Inductance	Tesla
7.	Magnetic Flux	Weber
8.	Electric Charge	Farad, Coulomb

Miscellaneous Facts:

1. The distance traveled is given by area under the curve of velocity-time graph.
2. The value of G is 6.67×10^{-11} N-m^2/ Kg^2. Centripetal Force = mv^2/r.
3. Kinetic Energy = ½ mv^2. Potential Energy = mgh.
4. Temperature in Celsius = 5/9 (T_f - 32). Bimetal strips are used in thermostat.
5. The equatorial radius is greater than polar radius by 21.5 km. Centrifugal force is zero exactly at the poles. Newton's first law is regarding inertia. Second law states that the rate of change of momentum of a body is directly proportional to the applied force & takes place in the direction of the force.
6. Force = mass x acceleration. Momentum = mass x velocity. Impulse = force x time.
7. Work = Force x distance in the direction of force. Power = work done/ Time taken.
8. Moment of a force = Force x Perpendicular distance of the line of action of force from the axis.

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9. Escape Velocity: $GMm/r^2 = mv^2/r$. Solving we get: $v = (GM/r)^{1/2}$. Moreover the centripetal force is equal to the gravitational force. Therefore, $mv^2/r = mg$. Solving we get $v = (rg)^{1/2}$. $g = GM/r^2$. From the equation $v = (GM/r)^{½}$, we see that v is inversely proportional to the square root of r. Thus if a satellite moves from a higher orbit to a lower one, its speed increases. Since the earth rotates form west to east, satellites are launched in a easterly direction to give them additional push.
10. The substances in ascending order of density are aluminium, copper, lead, mercury, gold & platinum.
11. Pressure is force/area. The pressure P at a depth h in a liquid of density , is P = h g.
12. In a hydraulic press the fundamental is that the ratio of the weight & Area should be the same on both the sides when the opposite plates are at the same level. For e.g. 10 N/ 5 cm^2 = 80 N/ 40 cm^2.
13. When ice melts in water the level of water remains unchanged as the ice contracts.
14. Stokes law for determining viscous force, F is $F = 6\pi\eta rv$ where η is the coefficient of viscosity, r is the radius & v is the velocity. After a stage the object acquires critical velocity which is higher for heavier objects.
15. Pressure in a fluid decreases with increased velocity of the fluid.
16. Surface tension causes the hairs of a paint brush to contract when it is taken out of water. Also sprinkling kerosene on water reduces its surface tension. Capillarity causes water to rise in a glass tube but mercury to drop because of differential cohesion & adhesion.
17. Latent heat of fusion is the heat required to convert a solid to liquid state.
18. Velocity of a wave V = f , where f is frequency & is wavelength. The number of images formed in case of an inclined mirror =[$(360^o$ – 1)/ Angle] – 1. Hence when angle is 90 three images will be formed.
19. Concave/convex mirrors are made by depositing vaporized aluminium on a glass surface. A convex mirror & plane mirror always form virtual image. A concave mirror forms a virtual or real image depending on the position of the object. When the object is at a distance lower than the focal length the image formed is larger & virtual. Hence concave mirrors are used in make-up mirror & by dentists. If an object is held close to a convex lens then the image formed is virtual & vice- versa. In case of a concave or diverging lens all images are virtual.
20. Refractive index is the ratio of speed of light in vacuum to speed in that medium.
21. The planets do not appear to twinkle due to lesser refraction of the light coming from them due to lower distance. Light can always pass from one medium to an optically denser medium but not vice versa due to total internal reflection.
22. Violet light travels at the slowest speed & red the fastest in transparent medium. Rainbow is formed by dispersion & total internal reflection .

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23. Red + Green = Yellow. Red + Blue = Magenta & Green + Blue = Cyan. Two colours which when mixed give white are known as secondary colours like blue & yellow.
24. In eye accommodation is achieved by ciliary muscles. Hypermetropia is treated by converging lens & myopia by diverging lens. Power of a lens = 1/ focal length.
25. A compound microscope has two short focal length converging or convex lens. The image seen in a microscope is inverted. An astronomical telescope has an objective of long focal length & an eye lens of short focal length. An astronomical telescope also produces an inverted image. In terrestrial telescope an extra lens is placed in between to produce an erect image of the object.
26. In a CD rainbow like colours are produced due to diffraction & reflection & not due to interference.
27. Sound waves below 16 Hz are infrasonic & above 20,000 Hz ultrasonic. The presence of water vapour increases the speed of sound. It travels faster on a hot day than cold day. On a warm day the air near the ground is warmer than the air above. This causes bending of sound away from the ground. The opposite happens on a cold day causing the sound to bend towards the earth. Thus on a cold day sounds can be heard over long distances.
28. The angle which a suspended bar magnet makes with the horizontal is called the angle of dip of the place. It is zero at equator & 90° at poles.
29. When a glass rod is rubbed with silk, the glass rod loose electrons & becomes positively charged & VV.
30. Resistance of a conductor R = L/A where is a constant called resistivity, L is length & A is area. Resistivity of a good conductor increases with temperature whereas for semiconductors it decreases.
31. Positive ions collect at cathode & negative at anode.
32. Heat produced by current $H = I^2Rt$, where I is current in amperes, R is resistance in ohms & t is time.
33. An inverter converts DC into AC. In domestic AC supplies 220 V is the effective value. The peak value of voltage is 311 V. The frequency is 50 Hz. A Fuse is made of tin-lead alloy. A fluorescent tube contains mercury vapours at low pressure. Infra red signals are used in TV.
34. Protons & neutrons are 1836 times heavier than electrons. The heaviest natural atom is that of Uranium. Artificial transmutation has been used to obtain elements beyond uranium. X rays are produced when accelerated electrons strike tungsten sheet. Number of protons is the atomic number & protons + neutrons form the mass number. For short distances nuclear forces are stronger than electrostatic repulsive forces.
35. In fission Uranium (235) splits into Barium (56) & Krypton (36) & ejects 3 neutrons. Graphite or Heavy water is used as moderator. Boron or Cadmium is used as controlling rods.

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36. Bright spots which are actually clusters of stars & gaseous clouds are called Nebulae. Orion Nebula is one of them in the Milky Way. Major constellations are Orion (hunter), Cygnus (swan), Hydra, Hercules etc. Hydra is the largest with 68 stars visible to naked eye & Centaurus has 94 stars.
37. Stars with mass less 1.4 times solar mass (Chandrasekhar Limit) converts into a white dwarf. Bigger than this converts neutron star (pulsar). Still bigger (mass greater than 5 times solar mass) end up as black holes.
38. The layers of sun are photosphere (core), chromosphere (surface) & corona (sun's atmosphere).
39. Ganymede, Callisto, & Titan are bigger than planet mercury. Uranus, Neptune & Pluto cannot be seen by naked eye. Ceres is the largest known asteroid.
40. Kepler's first law states that each planet moves in an ellipse with the sun at one focus. Second law says that a line drawn form a planet to the sun sweeps out equal area in equal times. The third law states that the ratio of the square of the planets year (T) to the cube of the planet's mean distance (A) from the sun is same for all the planets.
41. An OR gate gives a 1 if either of the input signals is 1. NOT gate generates a signal which is reverse of the original signal.
42. TCP (transfer control protocol), URL (universal resource locator), XML (Extensible markup language). CGI (common gateway interface).
43. One mile = 1.6 km. One nautical mile = 1.85 km. One gallon = 4.5 litres. 1 mm Hg = 133.3 pascal. One ounce (oz) = 31.1 grams. Parsec = 3.26 light years.
44. Bessemer process is for making steel from cast iron.
45. Isotones are nuclei having same number of neutrons but different number of protons. Isotopes have same number of protons but different neutrons. Isobars are nucleides with the same mass number.
46. Positron is antiparticle of electron. Tachyons are particle supposed to travel at a super-luminal velocity.
47. According to Ohm's law, $V = IR$, & power $P = VI$ or $P = I^2R$.
48. The earthing pin is longer to ensure that the gadget is earthed first & is thicker so that even by mistake it cannot be inserted in the live hole of the socket.
49. The f-number in a photographic camera is the focal length divided by the diameter of aperture.

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Biology

Biologists & Their Contribution

1.	Coined the term ‘cell’	Robert Hooke
2.	Binomial nomenclature	Carolus Linnaeus
3.	One gene one enzyme hypthesis	Beadle & Tatum
4.	Operon Concept	Jacob & Monod
5.	Jumping Genes concept	Dr. McClintock
6.	Human Blood Groups	Karl Landsteiner
7.	Fluid Mosaic Model	Singer & Nicholson

Classification of Animals

Types of Invertebrates

Placozoa	Single species identified as Trichoplax adherens.
Porifera	Sponges
Coelenterata (cnidaria)	Coral, hydra, jellyfish, Portuguese man-of-war, sea anemone
Platyhelminthes	Flatworms, flukes, tapeworms
Nematoda or Aschelminthes	Ascarids, vinegar eels, cyst nematodes, Pinworms, roundworms hookworms
Annelida	Lugworms, earthworms, leeches
Arthropoda	Crustaceans: prawn, shrimp Insects: butterfly, housefly, mosquito, cockroach Arachnids: Scorpion, wolf spider, King Crab Myriapods: Centipede, Millipede
Mollusca	Chitons, oysters, snails, clams, squid
Echinodermata	Star fish, brittle stars, sea urchins, sand dollars, sea cucumbers
Chordata	Divided into Hemichordata (tongue worm), Urochordata, Cephalanchordata, Gnathastomata.

Types of Vertebrates

Jawless fishes (Agnatha)	Hagfish, lamprey
Cartilaginous fishes	Sharks, skates, rays, chimaeras
Bony fishes	Sturgeon, herring, salmon, perch, cod, coelacanth
Amphibians	Frogs and toads, salamanders, newts, caecilians
Reptiles	Snakes, crocodiles, alligators, lizards, turtles, tortoises
Birds (Aves)	Penguin, flamingo, eagle, turkey, thrush, parrot
Mammals	Platypus, kangaroo, bat, lion, wolf, mouse, seal, antelope, cow, dolphin, whale, lemur, monkey, ape, human

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