1. Objects in motion tend to stay in motion, while objects at rest tend to stay at rest unless acted upon by an external force.
2. For every action, there is an equal and opposite reaction.
3. The speed of light in a vacuum is the same for all observers, no matter their motion relative to the light source.
4. Heat flows from a body of higher temperature to one of lower temperature until thermal equilibrium is reached.
5. Magnets have two poles: north and south, and like poles repel each other while opposite poles attract.
6. The angle of incidence equals the angle of reflection when light bounces off a surface.
7. The pressure at any point in a fluid at rest is the same in all directions.
8. The volume of a given mass of gas is inversely proportional to its pressure, provided the temperature remains constant.
9. Sound waves cannot travel through a vacuum because they require a medium to propagate.
10. The force of friction that acts between objects that are not moving is known as static friction.
11. A convex lens converges light, while a concave lens diverges it.
12. The color of an object is determined by the light frequencies it reflects; all other frequencies are absorbed.
13. A lever amplifies an input force to lift heavy loads with less effort, depending on the positions of the fulcrum, effort, and load.
14. The pitch of a sound is determined by its frequency: higher frequencies have higher pitches.
15. Water has a higher boiling point than alcohol because of the stronger hydrogen bonds between its molecules.
16. Objects with different masses fall at the same rate in a vacuum because the force of gravity acts equally on all masses.
17. When salt is dissolved in water, it lowers the freezing point of the water, a phenomenon known as freezing point depression.
18. Static electricity is the result of an imbalance of electric charges within or on the surface of a material.
19. The speed of sound is faster in solids than in liquids, and faster in liquids than in gases, due to differences in density.
20. A rainbow is formed by the refraction, dispersion, and reflection of sunlight in water droplets, showing a spectrum of light.
21. Pressure in fluids increases with depth due to the weight of the fluid above.
22. A prism can split white light into its constituent colors, a process known as dispersion.
23. Insulators prevent the flow of electric current, whereas conductors allow it.
24. The Moon's gravitational pull is responsible for the Earth's ocean tides.
25. The principle of flotation states that a floating object displaces a weight of fluid equal to its own weight.
26. Ice floats on water because it has a lower density than liquid water, a unique property among most substances.
27. A magnifying glass uses a convex lens to make objects appear larger by bending light rays toward the viewer's eye.
28. The phases of the Moon are caused by its orbit around Earth, changing how much of the Moon we see illuminated by the Sun.
29. Lightning is an electrical discharge caused by imbalances between storm clouds and the ground, or within the clouds themselves.
30. The angle of a shadow changes with the position of the Sun, which varies with the time of day and the season.
31. The speed of sound varies in different materials; it travels faster in solids than in liquids, and faster in liquids than in gases.
32. A solar eclipse occurs when the Moon passes between the Earth and the Sun, casting a shadow on the Earth.
33. A thermometer measures temperature by the expansion or contraction of a liquid, typically mercury or colored alcohol, in response to heat.
34. Objects appear to bend in water due to the refraction of light as it passes from one medium to another with a different density.
35. Balloons filled with helium float in air because helium is less dense than the surrounding atmosphere.
36. The color of the sky changes throughout the day due to the scattering of sunlight by the atmosphere; the amount and angle of scattering affect the color we see.
37. An object's shadow lengthens as the sun sets because of the changing angle at which sunlight reaches the object.
38. When you rub a balloon on your hair, static electricity is generated, causing your hair to stand up and the balloon to stick to walls.
39. The boiling point of water decreases at higher altitudes due to lower atmospheric pressure.
40. Siphoning involves moving a liquid from one container to another by means of a tube, with gravity and atmospheric pressure facilitating the flow.
41. Evaporation causes cooling because the molecules with the highest kinetic energy escape the liquid, reducing the average energy of the remaining molecules.
42. Mirages are optical illusions caused by the refraction of light through layers of air at different temperatures, often seen on roads on hot days.
43. A compass works by aligning its magnetic needle with Earth's magnetic field, pointing towards the magnetic North Pole.
44. The pitch of a sound changes as the source moves toward or away from you due to the Doppler effect, which shifts the frequency of the sound waves.
45. A vacuum flask minimizes heat transfer between its contents and the external environment through vacuum insulation.
46. Objects float in water when their density is less than that of water, following the principle of buoyancy.
47. The size of a shadow depends on the angle and distance of the light source relative to the object casting the shadow.
48. Electrical currents generate magnetic fields, a principle underlying the operation of electromagnets.
49. The energy efficiency of a lightbulb is determined by the amount of electrical energy converted into light versus heat.
50. Sound travels through materials as a series of compressions and rarefactions of the particles within the material.
51. Heat transfer can occur through conduction, convection, or radiation, affecting the temperature of substances in different ways.
52. The principle of moments states that for a system to be in equilibrium, the sum of clockwise moments about any point must equal the sum of anticlockwise moments about that same point.
53. The color of a heated object changes from red to white as its temperature increases, due to the spectrum of light it emits broadening.
54. Water's surface tension allows insects, such as water striders, to walk on its surface without sinking.
55. The angle of a ramp affects the amount of force needed to move an object up the ramp; the shallower the ramp, the less force required.
56. Objects with smoother surfaces experience less friction because there are fewer microscopic bumps to cause resistance.
57. The phase change from solid to liquid is called melting, where heat energy breaks the bonds between molecules in a solid, allowing them to move freely.
58. When light passes through a narrow slit, it spreads out instead of traveling in a straight line, a phenomenon known as diffraction.
59. An echo occurs when sound waves bounce off a surface and return to the listener, allowing us to measure distances based on the time delay.
60. By blowing over the top of a paper strip, it lifts due to the lower pressure created by the faster-moving air, illustrating Bernoulli's principle.
61. When salt is added to ice, it lowers the freezing point, causing the ice to melt faster, a process used in making homemade ice cream and de-icing roads.
62. A periscope uses two mirrors at 45-degree angles to see over or around objects, illustrating the law of reflection.
63. Static cling occurs when different materials are rubbed together, causing electrons to transfer and objects to attract due to opposite electrical charges.
64. Pressure cookers cook food faster by increasing the boiling point of water inside the sealed pot, which increases the cooking temperature.
65. Bicycles stay upright more easily when moving due to the gyroscopic effect of the spinning wheels, providing stability.
66. The process of convection in fluids circulates heat, as warmer parts of the liquid or gas rise while cooler parts sink, creating a cycle.
67. Objects that are denser than water sink when placed in water, while those less dense float, due to the principle of buoyant force.
68. A prism can separate white light into a spectrum of colors because different colors of light bend by different amounts when passing through the prism.
69. The apparent bending of a stick partially submerged in water is due to the refraction of light as it moves from water to air.
70. The human eye perceives color due to the response of cones in the retina to different wavelengths of light, enabling us to see a range of colors.
71. When ice melts, it absorbs heat from the environment, a process known as endothermic reaction, which cools the surroundings.
72. The North Star, Polaris, appears stationary in the night sky because it's located nearly above Earth's rotational North Pole, making it a pivotal point for navigation.
73. Sound cannot travel through space because it is a vacuum and has no medium (like air or water) for sound waves to travel through.
74. A sundial tells time by casting a shadow in a direction determined by the Sun's position in the sky, changing throughout the day.
75. When you see lightning, it takes time for the sound of thunder to reach you due to the speed of sound being much slower than the speed of light.
76. Objects with irregular shapes displace more water as they are submerged, increasing the buoyant force acting upon them, according to Archimedes' principle.
77. A magnifying glass uses the principle of refraction to magnify images, bending light rays to make objects appear larger than they actually are.
78. The persistence of vision is the phenomenon where multiple discrete images blend into a single image in the human mind, the principle behind motion pictures.
79. Shadows change length throughout the day because of the Earth's rotation, altering the angle at which sunlight strikes objects.
80. Rubber bands stretch because the applied force aligns the polymer chains in the direction of the force, making them longer and thinner.
81. Ice cubes crack when placed in a drink because of the rapid temperature change, causing the outer layer to expand faster than the inner core.
82. A rainbow is not only a circle of colors seen in the sky but actually a full circle, of which only the upper half is typically visible to observers on the ground.
83. A car's speedometer measures how fast the vehicle is moving by calculating the rotation speed of the wheels.
84. The popping sound you hear when opening a bottle of champagne is caused by the rapid release of carbon dioxide gas that was dissolved under pressure.
85. Heat lamps keep food warm by radiating infrared light, which is absorbed by the food and converted into heat, warming it without direct contact.
86. When you whirl a rock tied to a string, the rock follows a circular path because of the centripetal force acting on it, which is directed towards the center of the circle.
87. A mirror flips images horizontally but not vertically due to the way light reflects off it, preserving the law of reflection where the angle of incidence equals the angle of reflection.
88. The boiling of water involves bubbles forming not just at the surface but throughout the liquid as water vapor pressure exceeds the atmospheric pressure.
89. Static electricity is created when two surfaces touch and separate, causing a transfer of electrons that can result in a spark or a shock when touching a conductor.
90. The colors seen in soap bubbles are due to thin-film interference, where light waves reflected off the top and bottom surfaces of the bubble film interfere with each other.
91. When a ball is thrown up into the air, it slows down until it reaches its highest point due to gravity, then accelerates back down, demonstrating acceleration due to gravity.
92. The sky appears blue during the day because molecules in the Earth's atmosphere scatter sunlight in all directions and blue light is scattered more due to its shorter wavelength.
93. A magnifying glass can focus sunlight to a small point, creating enough heat to start a fire, illustrating the concentration of light energy.
94. Condensation on the outside of a cold glass of water occurs because humid air comes into contact with the cold surface, cooling the air and causing water vapor to condense.
95. The principle of conservation of mass states that mass cannot be created or destroyed in a closed system through ordinary chemical reactions or physical changes.
96. The echo phenomenon occurs when sound waves bounce off a surface and return to the listener, allowing us to measure the distance of obstacles by timing the sound's return.
97. A bicycle stays upright more easily when moving because the wheels' angular momentum stabilizes the bike, demonstrating gyroscopic effects.
98. Pressure differences cause wind: air moves from high-pressure areas to low-pressure areas, and the greater the difference, the stronger the wind.
99. The principle behind refrigerators is the removal of heat from inside the unit to the outside, relying on the thermodynamics of gases and liquids.
100. Polarization of light involves light waves vibrating in a single plane, which is why polarized sunglasses can reduce glare by blocking horizontal light waves reflected from surfaces.