

8th grade Science Facts

Matter

1. Matter is anything that takes up space and has mass.
2. Matter is made up of small particles called atoms.
3. Matter can exist as a solid, liquid, gas or plasma.
4. Matter can be classified as elements, compounds, and mixtures.
5. Matter can be described by its physical properties that include, but are not limited to, shape, density, solubility, odor, melting point, boiling point, and color.
6. Some physical properties of matter, such as density, boiling point, and solubility are characteristics of specific substance and do not depend on the size of the sample.
7. Equal volumes of different substances usually have different masses.
8. Matter can be described by its chemical properties that include, but are not limited to, acidity, basicity, combustibility, and reactivity (including the ability to rust).
9. A chemical property indicates whether a substance can undergo a chemical change.
10. Atoms of the same element are alike.
11. The atom is the basic building block of matter.
12. Atoms and molecules are perpetually in motion.
13. Protons are positively charged, found in the nucleus, and = the number of electrons.

14. Neutrons are neutral particles and are found in the nucleus.
15. Electrons are negatively charged particles found spinning around the nucleus.
16. The Bohr model is a model used to describe the atom but it does not depict the three dimensional aspect of an atom.
17. The electron cloud model represents our current theory of the atom which shows that the electrons are not in a fixed orbit but an electron cloud.
18. Compounds consist of two or more elements that are chemically combined.
19. Mixtures consist of two or more substances that are only physically combined.
20. Compounds can be classified in several ways including, acids, bases, salts, inorganic, and organic compounds.
21. Acids make up an important group of compounds that contain hydrogen ions.
22. Acids release hydrogen ions into solutions (H^+).
23. A base is a substance that releases hydroxide ions (OH^-) into solution.
24. pH is the measure of hydronium ion concentration in a solution.
25. pH ranges from 0-14.
26. pH less than 7 are acidic, solutions with pH greater than 7 are basic, pH of 7 is neutral.
27. When an acid reacts with a base, a neutralization reaction occurs resulting in a salt with water.

28. The periodic table of elements is an arrangement of elements according to atomic numbers and properties.
29. The information on the periodic table can be used to predict chemical reactivity.
30. The information within the boxes on the periodic table can provide you with the atomic symbol, atomic number, atomic mass, state of matter at room temperature.
31. The number of electrons in the outermost energy level determines an element's chemical properties and chemical reactivity.
32. Groups/Families are the vertical columns in the table.
33. Elements are in groups because they have similar properties because they have the same number of the electrons in their outermost energy level.
34. Periods are the horizontal rows on the table.
35. The periodic table is arranged in increasing order of atomic number.
36. The elements have a increasing nonmetallic character as you read from left to right across the table.
37. Along the stair-step line are the metalloids, which have properties of both metals and nonmetals.
38. Atoms react to form chemically stable substances that are held together by chemical bonds and are represented by chemical formulas.
39. To become chemically stable, atoms lose, gain, or share electrons.
40. Binary compounds are formed when two elements react chemically.

41. When a metallic element reacts with a non-metallic element, the metallic element's atoms gain or lose electrons forming ionic bonds.
42. When two nonmetals react, atoms share electrons forming covalent molecular bonds.
43. When matter undergoes physical change, the chemical composition of the substances does not change.
44. When matter undergoes a chemical change, different substances are formed.
45. The Law of Conservation of Mass states that in a chemical reaction, the starting mass of the reactants equals the final mass of the products..
46. The Law of Conservation of Energy states that energy cannot be created nor destroyed it can only be changed from one form to another.
47. A chemical equation represents the change that takes place in a chemical reaction.
48. In a chemical equation, the chemical formulas of the reactants are written on the left; an arrow indicates a change to a new substance; and the chemical formulas of the products are written on the right.
49. Chemical reactions are classified into two broad types: ones in which energy is released (exothermic) and ones in which energy is absorbed (endothermic).
50. Nuclear fusion is a process in which two or more nuclei combine to create an element. During the process of nuclear fusion energy is released.
51. Nuclear reactions produce a large amount of energy but there are potentially negative effects of using nuclear energy such as disposal of nuclear waste.

Energy

52. Energy is the ability to do work.
53. Energy exists in two states: potential and kinetic.
54. Potential energy is energy stored in an object. Energy can be stored chemically or based on position.
55. Kinetic energy is energy of motion. The amount of energy depends on the mass and velocity of the moving object.
56. Forms of energy: light, heat, chemical, mechanical, and nuclear.
57. Sound is a form of mechanical energy.
58. Energy in the form of heat is one of the by-products of most energy transformation.

Heat

59. Increased temperature means greater average energy of motion (kinetic energy) and most substances expand when heated.
60. The temperature of absolute zero (-273 degrees celcius/0 Kelvin) is the only situation where theoretically there is no atomic/molecular motion.
61. The transfer of heat occurs in three ways: conduction, convection, and radiation.
62. Heat and temperature are not the same thing. When heat is added to or taken away from a system, the temperature does not always change.
63. There is no change in temperature during a phase change; only a change in heat energy (freezing, melting, condensing, vaporizing, sublimation)

Sound

64. Sound is produced by vibrations and is a type of mechanical energy.
65. Sound travels in compressional waves and at a speed much slower than light.
66. Sound needs a medium (solid, liquid, or gas) in which to travel.
67. In a compressional wave, matter vibrates in the same direction in which the wave energy travels.
68. All waves exhibit certain characteristics: wavelength, frequency, and amplitude.
69. As wavelength increases frequency decreases.
70. The speed of sound depends on three things: the medium through which the waves travel, the density, and the temperature of the medium.
71. Reflection and interference patterns are used in ultrasonic technology, including sonar and medical diagnosis.

Light

72. Light travels in straight lines until it strikes an object where it can be reflected, absorbed, refracted, or transmitted.
73. As light waves travel through different media, they undergo a change in speed that may result in refraction (bending of the wave).
74. Light is a form of radiant energy that moves in transverse waves.

75. Transverse waves move at right angles to the direction the energy travels.
76. There is an inverse relationship between frequency and wavelength.
77. Electromagnetic waves are arranged on the electromagnetic spectrum by wavelength.
78. All types of electromagnetic radiation travel at the speed of light but in different wavelengths.
79. Radio waves are the weakest energy and have the longest wavelength and the lowest frequency.
80. Gamma rays are the strongest energy waves and have the shortest wavelength and the highest frequency.
81. Visible light lies between infrared and ultraviolet waves and makes up only a small portion of the electromagnetic spectrum (ROY G BIV).

Force and Motion

82. A force is a push or pull.
83. Force is measured in Newtons.
84. Forces cause objects to move, change speed, or change direction.
85. Speed is the distance per unit of time.
86. Velocity is speed in a given direction.
87. Newton identified three laws that describe the motion of all objects.
88. Newton's First law states that an object in motion (or at rest) will remain in constant motion (or at rest) unless it is acted on by an outside force.

89. Newton's Second law states that force equals mass times acceleration ($F=ma$)
90. Newton's Third law states that for every action force, there is an equal and opposite reaction force.
91. Weight is a measure of force due to gravity on the mass of an object.
92. Work is the force required to move an object over a distance.
93. Simple machines have different purposes: to change the effort needed (mechanical advantage), to change the direction or distance to which the force is applied, to change the speed at which the resistance moves, or a combination of these.
94. The work put into a machine is always greater than the work output due to friction.
95. The ratio of work output to work input is called efficiency.
96. Several factors affect how much electricity can flow through a system: Resistance is a property of matter that moves against the flow of electricity and thus some substances are more resistant than others.
97. Friction can cause electrons to be transferred from one object to another. These static charges can build up on an object and discharge slowly or rapidly.
98. Electricity can produce a magnetic field and cause iron and steel objects to act like magnets.
99. Electromagnets are temporary magnets that lose their magnetism when the electric current is removed.

100. Both a motor and a generator have magnets (or electromagnets) and a coil of wire that creates electricity.
101. The strength of an electromagnet depends on the number of wire coils wrapped around the iron core.