

Essential Facts for General Science

Scientific Investigation

1. Constants are parts of the experiment that remain the same.
2. An inference is a proposed explanation for an observation
3. Manipulated (Independent) variable is a factor that is intentionally changed in an experiment by the investigator.
4. Mass is the amount of matter that makes up an object. It does not change when its location changes.
5. There are two types of observations qualitative (using your 5 senses) and quantitative (involves measurements and numbers)
6. A responding (dependent) variable is a factor that is affected as a result of changing the manipulated (independent) variable
7. Volume is the amount of space an object takes up or occupies
8. All scientific measurement is done through the metric system. The basic unit of mass is gram, volume is liter, and length (distance) is meter.
9. To find length, use a metric ruler. To find volume of an irregular object use a graduated cylinder. To find mass use a triple beam balance.
10. The scientific method is a series of steps that scientists use to answer questions and solve problems.
11. Stating the problem is the first step in the scientific method. One asks a question that can be answered through scientific investigation.
12. A hypothesis is an educated guess, a proposed answer to your problem.
13. Conducting an experiment is testing your hypothesis.
14. Organizing your data is important in order to analyze your results.
15. One must state a conclusion after performing an experiment. You restate your purpose, describe your results and tell whether or not your hypothesis was supported by your data
16. Classification is a way of organizing by using characteristics.
17. Predictions are things you think will happen in the future based on past observations and experiences.
18. A good experiment should have at least 3 trials.
19. A control set up is a set up that is as close to the natural conditions as possible. It is what you compare you experimental set up with.

Life Processes

20. Food, water, air, shelter, energy and space are the life needs of organisms.
21. Growth, reproduction, energy transformation, respiration, waste removal, movement and responses are basic life processes. They are all dependent on energy transformations.
22. A food chain is a diagram of relationships between living organisms.
23. A food web is two or more food chains hooked together.
24. A pyramid shows relative amounts of energy available to each level.
25. Producers (autotrophs) are organisms that make their own food.
26. 1st level consumer-Primary consumer usually herbivores, animals that eat plants and algae
27. 2nd level consumer-Secondary consumers usually carnivores, animals that eat the primary consumers.
28. 3rd level consumer-Tertiary consumer's animals that don't have predators, they are considered the top of the food chain.
29. Heterotrophs are consumers, organisms that must obtain their food from eating other organisms.
30. Decomposers are organisms that break down other organisms.
31. The four parts of the water cycle are evaporation, condensation, precipitation, and collection.
32. In the carbon dioxide oxygen cycle, producers release oxygen for consumers who release carbon dioxide for the producer.
33. Nitrogen cycle is the circular path in which nitrogen moves through the environment.
34. Nitrogen is a gas that makes up 78% of the earth's atmosphere.
35. Nitrates are a combination of oxygen and nitrogen, absorbed by the roots of plants.

36. Nitrifying bacteria converts ammonia from dead plants and animals and animal waste to nitrates that can be used by plants.
37. Denitrifying bacteria converts ammonia from dead plants and animals and animal waste to nitrogen, which is released into the atmosphere.
38. Nitrogen converters combine oxygen and nitrogen to make nitrates. Example: lightning, bacteria in the soil, algae in wet places
39. Ammonia is a gas given off by dead plants and animals and animal waste.
40. Predators are animals that kill and eat other animals.
41. Prey is an animal that is hunted by other animals for food.
42. Omnivores are animals that eat animals and plants.
43. Herbivores are animals that eat only plants.
44. Carnivores are animals that eat only meat.
45. Scavengers are animals which feed on the remains of dead animals.

Matter

46. All matter has mass (the amount of matter), weight, volume (the space the matter takes up), and density (mass divided by volume).
47. Matter can be identified by its physical properties such as color, shape, and texture.
48. A physical change occurs when there is a change in the physical properties, but the chemical properties remain the same.
49. A chemical reaction occurs when both the physical and chemical properties have been changed.
50. A chemical change occurs when matter interacts with matter to form a new substance.
51. The Bohr model of the atom arranged the electrons in circular orbits around the nucleus.
52. An electron is a negatively charged subatomic particle that orbits the nucleus of an atom in a cloud.
53. A proton is a positively charged subatomic particle that is part of the nucleus of an atom.
54. A neutron is a neutrally charged subatomic particle that is part of the nucleus of an atom.
55. An atom is the smallest particle of an element.
56. An element is the simplest pure substance.
57. A compound is a pure substance formed by combining two or more elements. It can only be separated by chemical means.
58. A mixture is a combination of compounds and/or elements that can be separated by physical means.
59. A Periodic Table charts all the known elements and how they react.
60. The large letter on the chart represents the name of the element.
61. The atomic number represents the number of protons in an atom.
62. The atomic mass represents the number of protons and neutrons in an atom.
63. The number of neutrons in an atom can be determined by subtracting the atomic number from the atomic mass. Atomic mass - atomic number = number of neutrons

Energy

64. Kinetic energy is energy that is in use, the energy a moving object has is due to its motion
65. Potential energy is energy that is not in use and available to work.
66. The sun is the original source of all energy.
67. In order to do work, energy is transformed from one form to another. Energy is transformed but never created or lost. This is the law of conservation on energy.
68. Greenhouse effect is the earth heating due to the gases trapped in the atmosphere.
69. Electrical energy is generated by the kinetic energy of moving electrons in solar, mechanical, and chemical sources.
70. Sources from which energy is available include the fossil fuels, wind, water, solar, biomass, geothermal, and nuclear power.
71. Forms of energy are sound, radiant, wind, thermal, mechanical, electrical, and chemical.

72. Electrical currents are either direct currents in which electrons flow in one direction or alternating currents in which electrons can reverse their directions. (flow back and forth)
73. Electric currents produce magnetic fields (forces).
74. Renewable resources are resource, which can be used again and again, such as the sun, wind, and waves.
75. Non-renewable resources may not be used more than one time such as coal, oil, and natural gas.
76. Conductors are materials that allow electricity to flow through them, such as metal.
77. Insulators are materials that block electricity, such as rubber.
78. Voltage describes the "push" of electrons from a source.
79. An ampere (amp) is a measure of the rate of the flow of electrons.
80. Electrical energy is measured in kilowatts.
81. A series circuit is an electric circuit that has one path for electrons to take.
82. A parallel circuit is an electric circuit that has different branches providing several paths for electrons to take.

Earth, Sun, Moon, and Space

83. Our sun is a medium sized star that is the center of the solar system.
84. The seasons are caused by the relationship of the tilt of the earth's axis to its position around the sun.
85. The moon appears to go through phases because of a person's perspective from the earth as the moon revolves. One side is always lit, but we can only see part of it depending on its position.
86. The phases of the moon are new, waxing crescent, first quarter, waxing gibbous, full, waning gibbous, last quarter, waning crescent.
87. The period of revolution is when an object travels around another. For a planet, one revolution is one year.
88. The period of rotation is one spin on an axis. For a planet, one rotation is one day.
89. A solar eclipse occurs when the moon passes between the earth and the sun, casting a shadow on the earth.
90. A lunar eclipse occurs when the earth passes between the moon and the sun, blocking the sunlight from the moon.
91. A neap tide occurs when the moon and the sun are at 90 degree angles with the earth. The lowest of low tides.
92. A spring tide occurs when the moon is in line with the sun and the earth. The highest of high tides.
93. There are approximately two high tides and two low tides in each 24-hour cycle.
94. The gravitational pull of the moon attracts the molecules of water and soil that compose the earth.
95. The first four planets, Mercury, Venus, Mars and Earth are the inner planets because they are closest to the sun.
96. The six remaining planets, Saturn, Jupiter, Uranus, Neptune, Pluto are the outer planets because they are farthest away from the sun.