Tok Worksheet: Hard and Soft Sciences

1. Define science:
   Explain the difference between hard and soft sciences:

2. Using the list of separate fields below, group the sciences into categories of hard and soft.

Astronomy	study of the universe beyond Earth's atmosphere, includes Astrophysics and Cosmology
Electronics and computer science	branch of physics that deals with the behavior of electrons, Involves study of electric circuits involved in computers, Television, Radio. Telephones, and compact discs
Evolution	Branch of *Biology*. The theory that groups of organisms change with passage of time, mainly as a result of natural selection, so that descendants differ morphologically and physiologically from their ancestors
Anthropology	The scientific study of the origin, the behavior, and the physical, social, and cultural development of human beings
Mathematics	The Science of numbers and shapes
Economics	deals with the production, distribution, and consumption of goods and services and with the theory and management of economic systems
Earth sciences	geology (study of the origin, structure, and composition of the earth), oceanography , meteorology (study of the atmosphere and how it affects weather)
Human anatomy	study of the structure of living organisms which also includes physiology, the study of the various systems of the human body
Chemistry	concerned with chemical elements, the compounds they form, And the way the elements react to make new substances
Animal behavior	study of the way different kinds of animals behave
Ecology	science of the relationships between organisms and their environments
Psychology	The science that deals with mental processes and behavior.
Philosophy	branch of metaphysics that studies the soul, the mind, and the relationship of life and mind to the functions of the body.
Political science	study of the processes, principles, and structure of government and of political institutions; politics
Physics	concerns matter and energy)force and motion, light, sound, electricity, magnetism, structure of matter)
Sociology	study of human social behavior, especially the study of the origins, organization, institutions, and development of human society.
History	The branch of knowledge that records and analyzes past events

Linguistics	study of the nature and structure of human speech
Biology	The science of life and of living organisms, including their structure, function, growth, origin, evolution, and distribution. It includes botany and zoology and all their subdivisions

Hard Sciences	**Soft Sciences**

Provide specific examples of problems with adapting the social sciences to the twelve specific claims of Natural Science Make sure to vary the fields used from the list on the preceding page

Natural Science	**Social Science**
1. hypothesis is verified by experiment	
2. Can repeat experiments to verify hypothesis Predictions are not upset by outside variables	
3. Can isolate what hypothesis applies to.	
4. Scientists can predict- i.e. solar eclipse	
5. Hypothesis can be stated with precision And universality	
6. Can verify hypothesis by observation	
7. Raw material can be measured with precision	
8. Phenomena may be studied without regard To their past	
9. Scientist is objective-no relationship with his past	
10. Natural scientist indifferent to subject matter	
11. Facts dealt with can be unambiguously isolated	
12. There is objective reality	

Science (Latin *scientia,* from *scire,* “to know”), term used to denote systematized knowledge in any field, but applied usually to the organization of objectively verifiable sense experience. The pursuit of knowledge in this context is known as pure science, to distinguish it from applied science, which is the search for practical uses of scientific knowledge, and from technology, through which applications are realized.

Origins of Science

Efforts to systematize knowledge can be traced to prehistoric times. The oldest written records of protoscientific investigations come from Mesopotamian cultures; lists of astronomical observations, chemical substances, and disease symptoms, as well as a variety of mathematical tables, were inscribed in cuneiform characters on clay tablets. Ancient papyrus documents have been discovered in the Nile Valley, containing information on the treatment of wounds, on the distribution of bread and beer, and on finding the volume of a portion of a pyramid.

Rise of Scientific Theory

Among the first Greek scholars to seek the fundamental causes of natural phenomena was the philosopher Thales, in the 6th century BC. The mathematician and philosopher Pythagoras established a movement in which mathematics became a discipline fundamental to scientific investigation. At the Academy of Plato, deductive reasoning (*see* Deduction) and mathematical representation were emphasized; at the Lyceum of Aristotle, inductive reasoning and qualitative description were stressed. The interplay between these two approaches to science has led to most subsequent advances (*see* Logic).

During the so-called Hellenistic Age, foundations were laid for mechanics and hydrostatics, botany, trigonometry, and anatomy and physiology. In the 2nd century AD the *geocentric* (earth-centered) system, advanced by the astronomer Ptolemy, and the medical works of the physician and philosopher Galen became standard scientific treatises.

Medieval and Renaissance Science

During the 13th century, Chinese innovations led to European processes for manufacturing paper and gunpowder, and the use of printing and the mariner's compass. In 1543 the Polish astronomer Nicolaus Copernicus revolutionized astronomy, and Belgian anatomist Andreas Vesalius corrected and modernized the anatomical teachings of Galen. Vesalius's work led to the discovery of the circulation of the blood.

Modern Science

Italian physicist and astronomer Galileo led the development of modern scientific methods by systematic verification through planned experiments, using new instruments such as the telescope, the microscope, and the thermometer. In 1687 English mathematician and physicist Isaac Newton published his universal law of gravitation. The invention of calculus led to today's sophisticated level of science and mathematics.

Confidence in the scientific attitude inspired the so-called Age of Enlightenment. Scientific developments during the 18th century paved the way for some broad generalizations in science, including the atomic theory of matter, theories of electromagnetism, and the law of the conservation of energy (*see* Electromagnetic Radiation; Energy; Thermodynamics). Charles Darwin put forth evolution, the most comprehensive biological theory of the time. But as biology became more firmly based, physics was shaken by the consequences of quantum theory and relativity.

Scientific Communication

Throughout history, scientific knowledge has been transmitted chiefly through written documents. Since the Renaissance (14th century to 17th century) the fostering of scientific activity has been shared by universities and scientific societies. Governmental support of science led to the founding of the Royal Society of London (1662) and the Académie des Sciences de Paris (1666). During the 18th century academies of science, many of which publish journals, were established by other leading nations. Since the late 19th century, communication among scientists has been facilitated by the establishment of international organizations. The unions hold international congresses every few years, the transactions of which are usually published. Numerous major industrial firms also have research departments, some of which regularly publish accounts of their work.

Fields of Science

The pure natural sciences are generally divided into the physical sciences and the biological sciences, both of which can be subdivided.

The principal physical sciences are physics, astronomy, chemistry, and geology;

The chief biological sciences are botany and zoology. All classifications of the pure sciences, however, are arbitrary. In the formulations of general scientific laws, interlocking relationships among the sciences are recognized. These interrelationships are considered responsible for much of the progress today in several specialized fields of research, such as molecular biology and genetics. Several interdisciplinary sciences, such as biochemistry, have arisen. Advances can be the result of research by teams of specialists representing different sciences, both pure and applied.[1]

Social Sciences, sciences concerned with human society and the institutions, relationships, and ideas involved in social life. Fields include anthropology, sociology, political science, economics, history, law, psychology, criminology, and social psychology.[2]

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[2] *Encarta® 98 Desk Encyclopedia* © & ℗ 1996-97 Microsoft Corporation.