

Name: _____

Score: ____ / ____

Quiz 1 on Lectures 1 & 2

Part 1: Quiz 1 on Lectures 1 & 2

By developing a systematic method for evaluation of testable hypothesis, one can learn more than from mere conjecture or superstition. Which of the following statements best describes the logic of the scientific method?

- A. If observations are accurate, they will support the hypothesis.
- B. If a prediction is correct, it will lead to a testable hypothesis
- C. If the hypothesis is correct, certain test results can be expected.
- D. If a testable hypothesis is generated, tests and observations will support it
- E. None of these answers are correct.

Any gene can now be cloned and moved into plants for crop improvement purposes. Agricultural Biotechnology

- A. is responsible for widespread crop destruction worldwide
- B. is the best practice of choice used by organic farmers in the US
- C. has been widely used globally for genetic modification for crop improvement without a single substantiated health issue.
- D. is only theoretical and not products are yet in our stores.
- E. is not considered anywhere in the world to be controversial

Using the scientific method for evaluation ideas can be evaluated. Some people confuse the words: guess, hunch, hypothesis, and theory. Experiments are used to validate explanations. Which of the following best distinguishes hypotheses from theories in science?

- A. Theories are hypotheses that have been proven
- B. Hypotheses are tentative guess; theories are correct answers to questions about nature.
- C. Theories have a broad explanatory thesis involving many repeated observations, and experiment over time by many people; Hypotheses are usually more narrow in scope.
- D. Hypothesis and theories are the equivalent to fictitious fictions about the future, where some come true and others do not.
- E. Hypotheses, guess, hunches and theories mean essentially the same thing.

We can always ask a question about why? Why does this happen? About any observation. Experiments can be used to test our questions and yield observable and repeatable results to discern answers about these questions. Empirical results:

- A. are observations based on testable hypotheses.
- B. always must support a tested hypothesis about the question being addressed.
- C. usually cannot be replicated.
- D. are conjectures that are based upon and generated by theories
- E. are from experiments that rely entirely on intuition.

What is science? How does it differ from other ways of knowing about our reality? Observation of and wonder at the workings of nature are what initiate "why" and "how" type questions. Science is a system of:

- A. relying on one's best intuition, inspiration and perspiration to solve problems
- B. advertising as a devious enterprise conceived by entrepreneurial western capitalists to make money from the ideas of inventive and often eccentric minds
- C. making theories that fit certain beliefs about why and how things happen
- D. hypothesis making about the mysteries of life
- E. hypothesis making and testing to discern and validate observable facts generating evidence based knowledge

. We all have a very limited range of perception and knowledge of the world around us. How we know anything about our world is an age old problem. Science is:

- A. the only way to understand the natural world.
- B. a process that can be applied only within the hard science disciplines, such as biology, chemistry, and physics.
- C. both a body of knowledge and an intellectual activity encompassing observation, description, experimentation, and explanation of natural phenomena
- D. None of the answers are correct.
- E. a source of laws of nature to be taken on faith.

Most biologists agree that any animal can be cloned if the effort is put against the project. This procedure typically involves the removal of the nucleus of a body (somatic) cell and injecting it into an enucleated egg cell. Animal cloning.

- A. has been accomplished only in sheep.
- B. results only in highly mutated offspring and therefore of not practical use.
- C. as well as the genetic engineering of animals, has been accomplished for several different species.
- D. is condemned by the Vatican and other religious groups.
- E. is theoretical but has not yet been accomplished.

Something anecdotal has to do with anecdotes-little stories. Anecdotal evidence is based on hearsay rather than hard facts. People like to share stories about things that happened to them, or that they heard about, to make a point. That kind of talk is anecdotal: based on small, personal accounts. Anecdotal evidence:

- A. is a necessary part of the scientific method.
- B. relies highly on the intuition of the investigator and is often the only way to probe important causal links between two phenomena.
- C. is a more efficient method for understanding the world than the scientific method.
- D. links that may not exist can seem to be revealed between two phenomena, but the link may not actually exist.
- E. tends to be more reliable than data based on observations of large numbers of diverse individuals.

Sometimes observations are made which correlate with one another but may not have anything to do with each other. For example, the price of bananas last year correlated to the number of murders in Chicago or that vaccines correlates to the increase in autism. What is the meaning of the statement "correlation does not imply causation"?

- A. Just because two variables vary in a similar pattern means that they have a relationship to each other.
- B. It is not possible to prove the cause of any naturally occurring phenomenon.
- C. Just because two variables vary in a similar pattern does not mean that changing one variable causes a change in the other.
- D. When a change in one variable causes a change in another variable, the two variables are not necessarily related to each other in any way.
- E. It is not possible to demonstrate a correlation between two variables.

The genome contains the genetic information of an organism. The first draft of the Human Genome was first published in

- A. 1953
- B. has not yet been accomplished
- C. 2001
- D. 1949
- E. 2017

In order to conduct an experiment one must include controls. A Scientific control is an experiment or observation designed to minimize the effects of variables other than the independent variable. This increases the reliability of the results, through a comparison between control measurements and the other measurements. In controlled experiments:

- A. all variables are held constant.
- B. all critical variables are manipulated.
- C. all variables are independent of each other.
- D. all manipulated variables are dependent on each other.
- E. one variable is manipulated while others are held constant.

Why do some people get certain diseases and not others? Why do some medications work better for some people than others? Why do some people have certain side effects from medication while others do not? Knowing all the genes in humans allows the diagnosis and prediction of what types of medications may work well for one person and not another.

Pharmacogenomics:

- A. is the study of how variations in the DNA sequence of the human genome affect the response to medications and disease predispositions
- B. is a hypothesis that has not yet been tested or accomplished
- C. is currently not regulated in the US and banned from federal support because of its links to abortion rights issues
- D. is the science fiction of DNA forensics
- E. is controversial because it will predict a person's death

The use of biotechnology has far reaching applications, including agriculture, pharmacy, medicine, and forensics. With world fisheries in peril of over harvest, aquaculture advanced breeding, and biotechnology approaches offer some solutions. Marine biotechnology:

- A. is hopeful but has not yet been accomplished.
- B. is the use of salt water as an alternative energy source.
- C. will most likely cause the collapse of all existing wild fisheries.
- D. is the optimization and use of marine organisms by humans to produce something useful.
- E. is the use of advanced harvesting fishery technologies for the exploitation of fisheries without regulatory quotas.

Why do people believe what they believe? Is this cultural, by repeated experience or instinct? Beliefs are different from knowledge. Why do people believe what they believe? Superstitions are:

- A. because of their success rate and long heritage, proof that the scientific method is not perfect.
- B. known to be uniquely held by humans, but not by any non-human species
- C. are not logically related to a course of events but rather irrational beliefs.
- D. true beliefs that have yet to be fully understood.
- E. like alternative ideas to the mainstream just one of many possible forms of scientific thinking.

The sequence of information in DNA is fundamental to an understanding of biological function. The first draft of the human genome was published in the Journal Nature in 2001. Knowing all the genes in humans may have profound effects on which areas in the future?

- A. The areas in all of the answers have already been affected.
- B. Medicine, Cancer Biology and Pharmacy
- C. Marine Sciences, Aquaculture and Ecology
- D. Anthropology, Psychology, Psychiatry, and Forensics
- E. Insurance

Statistics is the practice or science of collecting and analyzing numerical data in large enough quantities to infer conclusions, especially for the purpose of inferring proportions in a whole from those in a representative sample. Statistical methods make it possible to:

- A. discern out of many observations how likely it is that certain results have occurred by chance.
- B. generated any data to test non-falsifiable hypotheses.
- C. regardless of the observations prove any hypothesis is true.
- D. unambiguously learn the truth whether the experiment was designed correctly or not.
- E. reject any hypothesis because of the large enough sample size.

Some people think that the use of biotechnology is unethical and that humans should not be involved with the manipulation of nature. Biotechnology is controversial because

- A. the use manipulation of crop plants has destroyed agriculture and negatively affected world health.
- B. it is the major cause of global warming.
- C. it has not been proven to be safe.
- D. largely because education about it has been lacking it has been perceived to have both position and negative potentials.
- E. various unseen side effects have not been adequately tested including geopolitical and destructive effects.

The use of DNA technologies (as through genetic engineering) and the use of living organisms or their components to produce useful usually commercial products (such as pest resistant crops, new bacterial strains, or novel pharmaceuticals), is not common place. Biotechnology is:

- A. the use manipulation of crop plants to control agriculture.
- B. the use manipulation of DNA to produce something harmful to people.
- C. the use of organic chemistry by humans to produce biochemical weapons.
- D. the major cause of global warming.
- E. the production of something biological and useful for people through the use of management of living organisms or their components.

The scientific method is at its basic a procedure that has characterized natural science since the 17th century, consisting in systematic observation, measurement and experiment, and the formulation, testing and modification of hypotheses.

The scientific method is:

- A. a process that can be applied only within the scientific disciplines, such as biology, chemistry, and physics.
- B. none of the answers are correct.
- C. a method as an intellectual activity encompassing observation, description, experiment and explanation of natural phenomena and a method to systematically gain a body of knowledge.
- D. the only way to understand the natural world and a Higher Power.
- E. an alternative method to many that requires certain laws of nature to be taken on faith or belief.

Isaac Asimov wrote that "science gathers knowledge faster than society gathers wisdom" and in no other field is this more apparent than biotechnology. There is currently a wide gap between the knowledge of the general public about DNA, recent advances in biology and biotechnology, as well as the actual applications in the real world most likely because

- A. the advances have been so rapid, often controversial, and this material is not required in most schools.
- B. the biotechnology companies have not been transparent to keep the public in the dark.
- C. it is simply irrelevant to the lives of most people in our society.
- D. in most states in the US teaching modern biology is dismissed in favor of religious studies
- E. it is conveyed in the mainstream media by religious organizations to make sure it is not funded.