Backup

Regulation

(Tossup 1) Dark spots on this object usually appear in pairs with opposite magnetic polarity. Winds from this object are deflected by Earth's magnetosphere. Within about 5.4 billion years, this object will turn into a Red Giant and engulf Mercury and Venus. For the point, name this yellow dwarf star that the Earth orbits, which sits at the center of the solar system.

ANSWER: the **sun** (prompt on "the star in the center of the solar system" or similar answers)

(Tossup 2) The change in Gibbs free energy is defined as the change in enthalpy minus this quantity times the change in entropy. The maximum efficiency of a heat engine is defined by this quantity for two reservoirs. Motion due to this quantity ceases at absolute zero. For the point, name this quantity that is measured on a scale named for Kelvin and describes how readily a system will accept or give up heat.

ANSWER: **temperature**

(Tossup 3) A crown formation of these organs is promoted by ethylene. One view point for the evolutionary necessity of this organ was to provide a better habitat for mycorrhizal fungi. This organ's system serves as an important initiator in the axis it forms with the vascular system and the plant's leaves. For the point, name this part of the plant that digs into the soil to absorb water and nutrients.

ANSWER: **root**s

(Tossup 4) An enzyme containing molybdenum [muh-LIB-duh-num] and cobalt, helps reduce a diatomic molecule of this element. Rhizobia helps fix a diatomic gas of this element in the soil, which is required for plant growth. With three atoms of hydrogen, this element forms the product of the Haber-Bosch process, ammonia. For the point, name this most abundant element in the Earth's atmosphere, with chemical symbol N.

ANSWER: **nitrogen** (accept di**nitrogen**; accept **nitrogen** gas; prompt on N or N2 before mention)

(Tossup 5) One instance of this type of landform in Punalu'u is black due to nearby basaltic lava flows. The zig-zag pattern of this type of landform is due to longshore drift. The shingle variety of this type of landform primarily has a higher percentage of pebbles in its washed-up sediment. For the point, name this type of landform along a coast of water, usually made up of pebbles and sand.

ANSWER: **beach** (prompt on the "coast"; prompt on "shore")

(Tossup 6) This computer concept can be achieved by using a series of flip-flops. In Von Neumann [NOY-men] architecture, this unit interacts with the ALU and Control Unit. RAM is a "random access" form of this concept. On a user level, this computer concept is achievable with a USB, an SD card, or a hard drive. For the point, name this ability of a computer to remember information.

ANSWER: **memory**

(Tossup 7) Early developments of a theory of this structure include Democritus's concept of them as geometric shapes with attributes. Some Greek thinkers believed a "swerve" of these things gave rise to free will. J.J. Thomson proposed the plum pudding model of this structure after his discovery of one of its components. For the point, name this structure once believed to be "indivisible," consisting of electrons orbiting a proton-neutron nucleus.

ANSWER: the **atom** (accept **hydrogen**; prompt on the "electron" with "apart of what larger structure?")

(Tossup 8) Paul Feyerabend was an active critique against this process, which he argued wasn't used in *Against Method*. Francis Bacon developed an early form of this method in *Novum Organum*. This method can be divided into five steps: formulation, hypothesis, prediction, testing, and analysis, For the point, name this method of observation and experimentation.

ANSWER: **scientific** method (prompt on method until mentioned)

(Tossup 9) Most instances of this shape have an Euler line which can be drawn through the center of the nine-point circle. This shape names an inequality that states that the absolute value of x plus y is greater than or equal to the absolute value of x plus the absolute value of y. By Euclid's parallel postulate, all the angles of this shape add up to 180 degrees. For the point, name this three-sided polygon.

ANSWER: **triangle**

(Tossup 10) Biogeography has developed primary and secondary zones named for this type of offspring that are analyzed for speciation data. This type of living creature usually exhibits polyploidy, incomplete dominance of both parental species, and sterility. Pizzlies are a rare example of, for the point, what type offspring, such as a mule or liger [LYE-gur], a mix between two species?

ANSWER: **hybrid**s

(Tossup 11) This class of compounds has a core structure made of 17 carbons fused together into three six member rings and one five member ring. These organic compounds are able to serve as signalling molecules which includes hormones like testosterone and progesterone. For the point, name this class of drugs that are sometimes abused in sports as a performance enhancer for their ability to increase muscle strength.

ANSWER: **steroid**s

(Tossup 12) In interpreting this science, De Broglie developed modern pilot wave theory. In response to the Copenhagen interpretation of this science, Albert Einstein retorted "God does not play dice with the universe." In this developed science, measuring the wave function causes it to collapse to a single state. Schrodinger's equation plays a key role in, for the point, what science of really small particles with discrete energy levels.

ANSWER: **quantum mechanics** (or **QM**; accept **quantum physics**; prompt on "physics"; prompt on "mechanics"; do not accept or prompt on "classical/Newtonian mechanics"

(Tossup 13) The zone of plucking refers to an area where this process occurs to bedrock due to glacial movement. Eventually, after this external process, deposition of the displaced sediment occurs. The sun and the Earth's heat are the two major energy sources for this weathering process. For the point, name this physical removal of material by natural forces like wind and water.

ANSWER: **erosion** (accept **weathering** until mentioned, prompt afterwards; accept specific forms of erosion like glacial **erosion**)

(Tossup 14) This element was first commercially produced via the Hunter process. A mineral containing this element, rutile, is the cause asterisms in gems. This relatively-inert transition metal is extracted in the Kroll process. The dioxide of this element is a common white pigment in paints and is used in sunscreen. For the point, name lightweight metal with atomic number twenty-two and chemical symbol Ti.

ANSWER: **titanium** (prompt on Ti until mentioned)

(Tossup 15) While a prisoner of war, John Edmund Kerrich ran an experiment where he performed this action 2000 times and showed it follows a random walk around 0.5. Perci Diaconi claimed to prove this discrete random event with two outcomes is 1% more biased to the side facing up at the start of this action. For the point, name this action, a textbook example of a 50-50 event because, in theory, heads and tails are equally likely.

ANSWER: **coin flip** (**coin toss**ing; accept specific **coin**s or synonyms for toss like **throw**)

(Tossup 16) The first person to discover evidence for this process was Henri Becquerel. The occurrence of this process in different isotopes of carbon is central to its use in dating. The electromagnetic form of this phenomenon is represented by a spectrum and comes in radio, ultraviolet, and infrared varieties. For the point, name this general term for the transmission of energy.

ANSWER: **radioactive** decay (accept **nuclear decay**, **radioactivity**, or **radiation**; prompt on decay)

(Tossup 17) This element forms a gas with hydrogen if it is present in a Marsh test. This is the most common Group 7 element used to dope semiconductors like gallium. Paul Ehrlich developed a "magic bullet" that used an organic compound containing this metalloid to treat syphilis, even though it's poisonous. For the point, name this yellowish metalloid with atomic number thirty-three and chemical symbol As.

ANSWER: **arsenic** (prompt on As until mentioned)

(Tossup 18) Quantum analogues of this force include a model of it as "spin foam" with "quantum loops." String theory is a theory of everything that incorporates this weakest fundamental force. Henry Cavendish used a torsional balance to determine a constant in Newton's universal law of this force. For the point, name this force that, on Earth, causes an acceleration of 9.8 meters per second squared and is denoted little g.

ANSWER: **gravity** (prompt on g)

(Tossup 19) Four members of the *Orthomyxoviridae* family causes this disease. The hemagglutinin [heme-ah-glut-uh-nin] and neuraminidase [nur-ah-am-in-uh-dase] antigens on the surface of the virus that causes this disease undergo rapid mutation making vaccination difficult. Subtypes of this disease include H2N3 and H1N1. Spain named a major outbreak of this disease in 1918. For the point, name this viral disease which shares many symptoms with the common cold.

ANSWER: in**flu**enza (accept swine **flu** or **bird** flu)

(Tossup 20) For a given location, these time periods are related to changes to time spent in the circle of illumination. These periods switch for the north and south hemisphere due to the inclination of the Earth's axis. These divisions of the year are categorized by daylight hours and weather patterns. For the point, name these four divisions of the year, which include spring and autumn.

ANSWER: **season**s

(Tossup 21) This compound was first isolated after Friedlieb Ferdinand Runge received a request from Wolfgang von Goethe. After steaming, this compound can be removed by introducing supercritical carbon dioxide. This purine-class molecule is likely to function by inhibiting adenosine receptors in the brain preventing the onset of "tired" signals. For the point, name this stimulant found in coffee beans and tea leaves.

ANSWER: **caffeine** (or **guaranine**; or **methyltheobromine** or **1,3,7-,trimethylxanthine**; or **Theine**)

(Tossup 22) Early examples of this device used spark gap transmitters. This device can pick up "skywaves" that have been bounced off the ionosphere. This device, invented by Guglielmo Marconi, can pick up signals that have either been modulated in their amplitude or frequency. For the point, name this device that picks up a namesake frequency of the electromagnetic spectrum on AM and FM stations.

ANSWER: **radio**s (or **radio receiver**s; accept **radio transmitter**s; accept **receiver**; accept **antenna**s since the clues overlap)

(Tossup 23) Sets described by this concept can be represented with aleph numbers. The least integer principle allows for a method of proof by this concept's descent. A series converges if it approaches a constant number at the series approaches this concept. John Wallis developed the symbol for this concept which looks like a sideways eight. For the point, name this concept that refers to a limitless quantity.

ANSWER: **infinity** (accept **infinite**)

(Tossup 24) Only in cases of Prader-Willi syndrome does higher ghrelin correlate positively with this condition. A strain of mice named for getting this condition have a mutation in the leptin encoding gene, produced primarily by adipocytes. This condition leads to increased risk for type II diabetes and cardiovascular disease; it is characterized by a BMI over 30. For the point, name this condition of extreme body fat accumulation.

ANSWER: **obesity** (or **obese**; prompt on "being fat" or "overweight")

(Tossup 25) This shape is the trajectory of an object moving greater than the escape velocity. This shape names a class of functions that include sinh ["sinch"] and cosh ["cawsh"]. This is the shape of equations of the form [read slowly] x squared over "a" squared minus y squared over b squared equals one. For the point, give this conic section of a plane and double cone with two bows that are mirror images of each other.

ANSWER: **hyperbola**

(Tossup 26) In mass spec, this element is indicated by an M-plus-2 peak of the same height as the M peak. This element names a test for detecting unsaturation in hydrocarbons. This halogen is a reddish brown liquid at room temperature. This element can exist in a +2 oxidation state like its neighbor Krypton. For the point, name this element with atomic number thirty-five and chemical symbol Br.

ANSWER: **bromine** (prompt on Br until mentioned)

(Tossup 27) Astronaut Dan Burbank photographed one of these objects named Lovejoy. A famous example of one of these objects is also designated 1P and has an orbit of 75 years. An atmospheric effect gives these objects a coma, and they are sometimes accompanied with an icy tail. For the point, name these "cosmic snowballs" which include a famous one named for Halley [HAY-lee].

ANSWER: **comet**s (accept **Halley**'s **comet**)

(Tossup 28) The upslope form of this phenomenon occurs in the Great Plains due to humid winds moving from the Mississippi to the Rocky mountains. Advection and radiation forms of this phenomenon can cause visibility problems in cities like San Francisco. This phenomenon is caused by clouds whose base is at, or close to, the ground. For the point, name this phenomenon which can sometimes be mistaken for smog.

ANSWER: **fog**

(Tossup 29) In lung physiology models, the condition named for these structures is an assumption of perfect gas exchange. A genus of Amoeba can cause a potentially fatal disease by covering these structures with mucus, which has impacted Atlantic salmon populations. Zoologists refer to these structures as Branchia. For the point, name these respiratory organs that allow fish to extract dissolved oxygen.

ANSWER: **gill**s (accept **Branchia** before mentioned)

(Tossup 30) Within this organ is a structure whose number of cotyledons is used for classification. These organs are typically edible, but phyloclades prefer genetic-transfer through latching their product onto animal fur. These organs develop from the ovaries of flowers and store a specialized embryo that will later germinate in the soil to grow a new plant. For the point, name these seed-bearing organs like bananas, blueberries, and apples.

ANSWER: **fruit**s

Extra

(Tossup 31) As of 2016, the largest calculation with this unit was 93 billion. This whole number is equal to approximately 9.46 trillion kilometers. 3.26 times this distance is equal to one parsec. This astronomical distance is commonly confused for a time since it has a unit of a time in its name. For the point, name this distance that it takes a photon to travel in 365 days.

ANSWER: one **light year** (accept **light years**; the "largest calculation" is the size of the observable universe)