

Extra Questions

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(1) **The patched conic approximation is often used when performing calculations for moving between two of these systems, and "Halo" types of these systems are around an unstable (+) Lagrange point. The vis viva [[VEES-VEE-vah]] equation is used to calculate the velocity of objects involved in these, and these systems are (*) elliptical according to the first of Kepler's three laws pertaining to them. For the point, name these trajectories of planets around a star.**

ANSWER: Planetary orbits

(2) **Soft repeaters of this kind of radiation are believed to originate in starquakes in magnetars and neutron stars with orbiting fossil disks. Large amounts of this radiation are released from jets caused by (+) tidal disruption events and hypernovas. An initial flash of this radiation followed by a lower energy afterglow is characteristic of this radiation's namesake (*) "bursts." For the point, name this radiation that has a higher frequency than X-rays.**

ANSWER: Gamma radiation (or Gamma rays; accept Gamma ray burst; prompt on "GRB")

(3) **Distortions of this sense are known as dysgeusia [[dis-]OO-syah]]. A conditioned aversion to this sense following illness is named for Dr. John Garcia. One type of G protein-coupled receptors transmit a type of this sense called (+) umami [[oo-MA-mee]]. This sense detects compounds such as glutamate [[GLOO-tah-"mate"]] and tannins which activate (*) receptors within the papillae [[PAP-ih-lay]]. Strongly linked to smell, for the point, what is this sense that is conducted from namesake buds on the tongue?**

ANSWER: Sense of Taste (or Gustation)

(4) **A three thousand-year old Japanese skeleton discovered in 2021 provides evidence for the oldest known one of these events. Common methods for preventing these events include drumline traps and nets that emit (+) electrical frequencies. These events often happen when a certain animal mistakes a surfer's (*) silhouette for that of a seal or other marine mammals. For the point, name these events in which a large cartilaginous [[kar-tih-LAH-jih-nus]] fish injures or kills a human.**

ANSWER: Shark attack (or Shark bite; accept descriptive answers involving humans being attacked and/or injured by sharks)

(5) **At a transition temperature named for this substance, polymers enter a viscous, rubbery state. Electronic pH meters often use an electrode made from this substance, whose most prevalent type contains lime and soda. Hydrofluoric acid is commonly used to (+) etch this material. Most modern labware consists of this material's (*) borosilicate [[boh-roh-SIH-lih-kut]] variety, which is called Pyrex. For the point, name this amorphous [[ay-MOR-fus]] material used to make beakers and test tubes.**

ANSWER: **Glass** (accept Soda-lime **glass**; accept Borosilicate **glass**)

(6) **This quantity is plotted on the X-axis of a diagram commonly used to visualize heat transfer in a Carnot [[kar-NOH]] cycle. This state function is measured in units of Joules per Kelvin. This quantity equals (+) Boltzmann's constant times the natural log of the number of microstates, and never decreases in isolated (*) systems according to the Second Law of Thermodynamics. For the point, name this quantity symbolized "S," a measure of a system's disorder.**

ANSWER: **Entropy** (accept **S** before mentioned)

(7) **Ammonia can be detected using a solution of this element's iodide called Nessler's reagent. A methylated calibration standard for NMR machines containing this element killed scientist Karen Wetterhahn when a drop of it seeped through her glove. (+) Calomel reference electrodes often contain the chloride of this element, whose primary ore is called cinnabar. An experiment performed by Torricelli [[toh-rih-CHEH-lee]] measured (*) atmospheric pressure using units of millimeters of this element. For the point, name this metal symbolized "Hg" that is a liquid at room temperature.**

ANSWER: **Mercury** (accept **Hg** before mentioned; accept **Quicksilver**)

(8) **Apache Ant is a packaging tool used to build files written in this language, the default graphics library of which is called Swing. Its namesake Virtual Machine enables this language to run across multiple (+) operating systems, and this language is augmented by the React framework and the (*) JQuery [[JAY-kweh-ree]] library. For the point, name this object-oriented programming language developed by Oracle, whose name refers to a cup of coffee.**

ANSWER: **Java** (accept **Java** Virtual Machine; prompt on "JVM"; do not accept or prompt on "Javascript")

(9) **This quantity is measured by the rate of cooling of extremely thin tungsten wires in a "hot-wire" device. This quantity is related to observed conditions by the Beaufort scale. A simple device used to measure this quantity consists of (+) cups on arms arranged in a radially symmetric manner around an axle. Like direction, this quantity can be measured with an (*) anemometer [[an-eh-MAH-meh-ter]]. For the point, name this quantity which can be over 200 miles per hour during a tornado.**

ANSWER: **Wind Speed** (or **Wind Flow** Speed; prompt on "wind"; prompt on "speed")

(10) **Plasma torch gasification may be applied to this general type of material to prevent it from producing leachate [[LEE-chate]] or generating methane pollution, while also producing syngas for generating electricity. The company Bigbelly produces a (+) solar-powered machine that compacts this material. This material's accumulation in (*) oceanic gyres creates namesake patches, including one named the "Great Pacific." For the point, name this material stored in landfills.**

ANSWER: **Garbage** (or **trash**, or **waste**, or **refuse**, or **rubbish**, accept word forms and other equivalent answers: accept Great Pacific **Garbage** Patch; prompt on "pollution")

(11) **This task can be carried out by comparing parent and daughter materials on an isochron plot. Clay is a common material used in the K-AR [[K-A-R]] technique for this task. One technique for performing this task uses zircon to calculate the (+) uranium-thorium-lead decay chain. Another method for performing this task uses the ratio of the (*) twelve and fourteen isotopes of carbon. For the point, name this process of using radioactive decay to determine when an object came into existence.**

ANSWER: Radiometric **Dating** (accept Radiocarbon **Dating**; accept Uranium-Lead **Dating**; accept descriptive terms referring to finding a **date** or an **age** of an object)

(12) **The positive displacement type of these devices work by trapping and moving small amounts of fluids in a continuous way. Fluid motion is alternated between two chambers separated by a flexible rubber seal in the (+) diaphragm type of these devices. Pressure is reduced in a sealed container with the vacuum type of these devices. (*) Reciprocating examples of these devices power hand-operated wells. For the point, name these devices that are used to inflate tires.**

ANSWER: **Pump** (accept Positive Displacement **Pump**; accept Diaphragm **Pump**; accept Vacuum **Pump**; accept Reciprocating **Pump**; accept Tire **Pump**)

(13) **A thermal cutoff is a type of this object found in small electronic devices that activates at high temperatures. The unicode symbol for these devices is a straight line through a rectangle. In modern homes, these devices have been largely replaced by (+) circuit breakers, which unlike these devices, can be used (*) multiple times.** For the point, name these devices used to protect circuits from surges, which "blow" under high currents.

ANSWER: **Fuse**

(14) **This quantity increases with higher coefficients of performance for AC units. This quantity symbolized *eta* [[EH-tah]] is maximized when cold and hot reservoirs respectively have zero and unlimited temperature. A (+) Carnot [[kar-NOH]] cycle theoretically has the maximum value for this quantity, which is equal to the ratio of (*) work output to heat input.** For the point, name this quantity which is 100 percent for ideal thermodynamic systems, the measure of the amount of heat loss in an engine.

ANSWER: Thermal **Efficiency** (or Thermodynamic **Efficiency**)