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Tossups

1. This leader banned the practice of buying and selling provincial governorships, which was known as suffragia [suf-ruh-JEE-uh]. To win support when he opposed the Three Chapters, this leader kidnapped Pope Vigilius [vee-JEE-lee-us]. The Codex Constitutionum was part of the collection of Roman laws and legal decisions named as this person's code. Much of the history of this leader was recorded by Procopius [proh-KOH-pee-us], who traveled with his general Belisarius [beh-lee-SAR-ee-us]. Belisarius helped this leader gain territory that had belonged to the Western Roman Empire. Name this 6th-century Byzantine emperor who, along with his wife Theodora, ordered the construction of the Hagia Sophia.
Answer: **Justinian I** or **Justinian the Great** [or Flavius **Justinianus** or Petrus **Sabbatius**; prompt on **Justinian**]

2. A collection of 21 songs by this composer was inspired by his friendship with Ede Reményi [ED-uh reh-MEE-nee], and this composer sometimes performed them as part of a piano duet. This composer wrote a seven-movement work whose fifth movement was added after the piece was first performed with a soprano solo. This composer put the "Wie lieblich sind deine Wohnungen" [vee LEEB-lik sind "DIE"-nuh VOH-nun-gun] chorus in the fourth movement of that work, and the entire work is based on Martin Luther's Bible. Name this German composer of *Hungarian Dances* and *A German Requiem*.
Answer: Johannes **Brahms**

3. When a boy on horseback asks this novel's protagonist for a drink of milk, the protagonist says there is no milk in town, so some children are dying. Soon after that, shining cans of milk are delivered. This novel then describes a letter from Mr. Carmichael saying that a young man will be hanged for murder. An earlier letter in this novel is from Theophilus [thee-AH-fuh-luss] at the Mission House, stating that Gertrude is very sick. This novel is about a reverend who travels from Natal [nuh-TAHL] Province to Johannesburg. Name this novel about Stephen Kumalo [koo-MAH-loh] written by Alan Paton [PAY-tun].
Answer: ***Cry, the Beloved Country***

4. The way that this phenomenon occurs around carbon can be classified as *tet*, *trig*, or *dig*. The existence of directional bonds and this phenomenon explain the low melting points of neptunium [nep-TOO-nee-um] compared to similar elements. In the isovalent ["eye"-soh-VAY-lent] types of this phenomenon, the size differences can be explained by Bent's rule. Types of this phenomenon correspond to types of molecular geometries. This phenomenon occurs when atomic orbitals combine to distribute their energy more evenly. Name this phenomenon that can be classified, for example, as sp^2 ["S P two"] or sp^3d ["S P three D"].
Answer: orbital **hybrid**ization [accept **hybrid**ized orbitals or **hybrid**izing]

5. The centers of all circles that are tangent to a fixed circle and pass through a fixed point outside the fixed circle form this shape. An object launched at an angle and at greater than the escape velocity will follow a path that is part of this shape. The axes of this shape are called "transverse" and "conjugate". The difference between the distances of any point on this shape to two fixed points is constant. This shape has an eccentricity greater than 1. Part of this shape is created by slicing a cone perpendicular to its base. Name this conic section with two branches.
Answer: **hyperbola** [prompt on **conic** section before "conic"]

6. The constitutional clause granting Congress the power to initiate these actions also gives Congress the power to grant letters of marque ["mark"] and reprisal. A 1973 joint resolution allows these actions to begin on an emergency basis if Congress is given notice within 48 hours and passes an A.U.M.F. within 60 days. The Supreme Court case *Schenck v. U.S.* found that First Amendment protections could be curbed by the Espionage Act during these events. Congress has used its power to declare these actions in 1812, 1846, 1898, 1917, 1941, and 1942. Name this type of major conflict.
Answer: **war**s

7. During this battle, Marshal Soult [soolt] listened to his commander say "One sharp blow and the war is over", then led a successful charge up the Pratzen Heights. This major battle followed the Ulm campaign, which had the same result. Shortly after this battle, the Holy Roman Empire signed the Treaty of Pressburg. Mikhail Kutuzov [koo-TOO-zuf] wanted to retreat before this battle, but he was overruled by Alexander I. This largest battle in the War of the Third Coalition was a big success for Napoleon. Name this massive 1805 battle that took place in the Austrian Empire.
Answer: Battle of **Austerlitz** or Battle of the **Three Emperors**

8. Some of these substances, especially hydro·philic ["hide"-roh-FILL-ik] ones, are able to expand by *ad*sorbing water through imbibition [im-buh-BISH-un]. When surfactant molecules are dispersed in one of these substances, micelles ["my-SELLS"] can form. Nephelometers [nef-uh-LAH-mih-turz] are used to measure these substances by taking advantage of an effect that is very similar to Rayleigh scattering. These substances contain particles that are between 1 and 1,000 nano·meters long. The scattering in these substances is the Tyndall [TIN-dahl] effect. Name this type of mixture that includes foams, sols, gels, and emulsions.
Answer: **colloid**s [**KAH-loyd**z]

9. This play begins with a woman calling her husband a "cluck" and describing a Bette [BET-ee] Davis movie to him. Later in this play, that husband tells another man about an old friend who accidentally shot his own mother and then accidentally killed his own father in a car crash. This play was initially awarded the 1963 Pulitzer, but the trustees of Columbia University refused to allow the award to be given for it. The wife in this play invites a biology professor and his wife over for drinks, but the visit becomes very awkward because of the fighting by George and Martha. Name this play in which the guests are Nick and Honey and which was written by Edward Albee.
Answer: ***Who's Afraid of Virginia Woolf?***

10. An international timing array named for these objects searches for gravitational waves. That project includes the Parkes Observatory in Australia, which has discovered most known examples of these objects. Classification as this type of object requires having the right combination of magnetic field strength and spin frequency. Because of the effect that these astronomical objects are named for, it is very easy to determine their period of rotation. Identify these rotating neutron stars named for the fact that the streams of particles coming from them alternately point towards and away from Earth, which makes them appear to turn on and off.
Answer: **pulsar**s

11. In response to this conflict, one person sent his wife Frances to England for help. Charles the Second sent 1,000 troops, but their side won before the troops arrived. One leader of this conflict was replaced by John Ingram after dying from dysentery. That side consisted largely of indentured servants and Black slaves who wanted to kill all Native Americans. At the beginning of this conflict, a colonial governor bared his chest and dared a person to kill him; that governor was William Berkeley [BARK-lee]. Name this conflict that took place in 1676 around Jamestown, Virginia.
Answer: **Bacon**'s **rebellion**

12. A depiction of Jesus by this painter is 200 centimeters wide but only 30 centimeters tall and shows the eyes of Jesus rolled up [pause] and the back of his hand as bluish. That painting from the 1520s is *The Body of the Dead Christ in the Tomb*. Another painting by this artist depicts Jean de Dinteville [zhahn duh deent-veel] and Georges de Selve [zhorzh duh selv] standing on opposite sides of shelves with several objects, including two globes and a lute with a broken string. This artist painted a skull in anamorphic [an-uh-MOR-fik] perspective at the bottom of that painting. Name this German painter of *The Ambassadors*.
Answer: Hans **Holbein** the Younger

13. Like bull and bear contracts, this financial instrument can be classified as callable ["CALL-uh-bull"], which allows this instrument to be redeemed early. For historical reasons, the yield of this type of financial instrument is called its coupon rate, and when this financial instrument does not pay interest, it is called zero-coupon. Treasury bills are this type of security. Corporate and government credit ratings have a major effect on this financial instrument. Companies and governments issue this type of security to raise money. Name this investment alternative to stocks.
Answer: **bond**s [prompt on fixed-income **security**/ies or **treasury bill**s]

14. This play contains the line "I will not lend thee a penny", which leads to the response "Why then the world's mine oyster, which I with sword will open." That response is spoken by Pistol, who along with Bardolph and Nym are lower-class characters in this play. This play features a French doctor named Caius, whose ability to speak English is sometimes mocked by the Host of the Garter Inn. In this play, a man writes nearly identical love letters to two different married women, who join forces to play tricks on him. Name this play by William Shakespeare featuring Mistress Ford, Mistress Page, and Falstaff.
Answer: *(Sir John Falstaff and) the* ***Merry Wives of Windsor***

15. A choke is the same thing as one of these circuit elements but with a very low Q factor. The impedance of these objects varies directly with the frequency of their circuits. These objects cause current to lag electromotive force in an alternating-current circuit. A resonant circuit must have a capacitor and one of these circuit elements, and it sometimes has a resistor. These circuit elements work by creating a magnetic force that opposes changes in current. Name these circuit elements that can be made by looping wire around a magnetic core, and whose strength is measured in henries.
Answer: **inductor**s

16. Because of his service leading troops in this battle, Kentucky governor Isaac Shelby was awarded the Congressional Gold Medal. Shortly before this battle, the losing side had abandoned and burned Fort Malden, which caused dissension between Henry Procter and his allies. This battle was fought near Moraviantown. This United States victory built on success at the Battle of Lake Erie. Like the Battle of Tippecanoe two years earlier, this was a victory for William Henry Harrison. Name this battle fought in 1813 in Canada, at which Roundhead and Tecumseh were killed.
Answer: Battle of the **Thames** [**temz**] [accept Battle of **Moraviantown** before "Moraviantown" is mentioned]

17. In a novel by this author, a man's Madrid, Texas relatives uncomfortably get together with his Mount Salus [SAL-us], Mississippi relatives after he dies. This author portrayed that man, Judge McKelva, dying when his second wife, Fay, tries to move him after he has had eye surgery. In a short story by this writer, a family rift worsens when Stella-Rondo claims that Sister does not like Papa-Daddy's beard. In that short story, this writer has the narrator, who is Sister, explain why she moved away from her family. Name this author from Mississippi who wrote *The Optimist's Daughter* and "Why I Live at the P.O."
Answer: Eudora (Alice) **Welty**

18. A very bright object of this type is carried by Surtr [SURT-ur], who destroys the Earth during Ragnarök [RAG-nuh-"rock"]. Freyr had an object of this type that was able to perform without human assistance, but he lent it to Skírnir and had to use an antler instead of this object at Ragnarök, which benefitted Surtr. Peter Pevensie used an object of this type named Rhindon when he led a revolutionary army in *The Chronicles of Narnia*. Unferth owned one of these objects that was always successful and which he loaned to Beowulf; that object was Hrunting [RUN-teeng]. Identify these objects such as King Arthur's Excalibur.
Answer: **sword**s [prompt on **blade**s or **weapon**s]

19. One of this poet's works consists of the lines "Here we are all by day; by night we're hurled by dreams, each one into a several world." Another poem by this writer states "Come, let us go, while we are in our prime." That poem, which begins "Get up, get up for shame, the Blooming Morn", is "Corinna's [kuh-RIN-uh'z] going a-Maying". Another poem by this writer states "That Age is best, which is the first." That poem ends "For having lost but once your prime, you may forever tarry." This writer began that poem with the line "Gather ye Rose-buds while ye may." Name this English poet who wrote "To the Virgins, to Make Much of Time".
Answer: Robert **Herrick**

20. The amount of this enzyme is measured in the falling number test, which measures sprout damage based on how fast a stirrer sinks. This enzyme was originally called "diastase" ["DIE"-uh-stayss], which was the first time an enzyme was named with the "-ase" ["ace"] suffix. The beta form of this enzyme is produced by bacteria, fungi, and plants and is used to break down cereal grains. A version of this enzyme secreted by the pancreas is used by the body to get maltose. The best-known example of this enzyme, which can be called ptyalin ["TIE"-uh-lin], is secreted in the mouth and continues working in the stomach. Name this enzyme concentrated in human saliva that gets sugars from starch.
Answer: **amylase** [accept alpha-**amylase** before "beta"; accept **diastase** before it is mentioned]

21. The most common statement of Menelaus's [men-uh-LAY-uss'z] theorem sets the product of the ratio of three lengths equal to this number by taking direction into account. If a series of positive numbers is decreasing, then multiplying the terms by powers of this number gives a converging series according to the alternating series test. According to Euler's [OY-lur'z] identity, this number equals e raised to the power of i times pi. Using this number as an exponent is equivalent to taking the reciprocal, and writing this number as a superscript is used to represent the inverse of a matrix or function. Identify this number whose square root equals i.
Answer: **-1**

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Bonuses

1. Every time this number goes up by one, there are two more possible azimuthal [az-ih-MOO-thull] quantum numbers.

A. Name this first of four quantum numbers for electrons in an atom, typically represented as a lowercase n.

Answer: **principal** quantum number

B. This type of orbital is allowed when n equals 4, but it does not exist when n equals 3.

Answer: ***f*** orbital

C. The number of these spherical nodes in an orbital equals n minus 1.

Answer: **radial** nodes

2. This Chinese dynasty lasted from 221 to 206 BCE.

A. Name this dynasty started by the first emperor of a unified China, whose name is sometimes given as Shi Huangdi.

Answer: **Qin** ["chin"] dynasty [accept **Kin** or **Ch'in**; do not accept **Qing**]

B. Shi Huangdi suppressed intellectuals, ending this scholarly Chinese period that existed during the Spring and Autumn Period and the Warring States Period.

Answer: **Hundred Schools of Thought** [or **zhuzi baijia**]

C. Shi Huangdi ended this school of thought that emphasized love without distinctions.

Answer: **Mohism** or **Mohist** school [or **Mozi**]

3. This church is sometimes called the Egyptian Orthodox Church.

A. Name this Christian church headquartered in Alexandria, Egypt.

Answer: **Copt**ic Orthodox Church of Alexandria

B. The Coptic Church claims to have been founded by this apostle who wrote the second gospel in the New Testament.

Answer: **Mark**

C. The Coptic Church split from other Christian churches after this 451 CE council due to a dispute over whether Jesus has one nature or two natures.

Answer: Council of **Chalcedon** [**KAL-sih-dahn**]

4. This poem mentions "A gown made of the finest wool" and "Fair lined slippers for the cold".

A. Name this poem that begins "Come live with me, and be my love."

Answer: "The **Passionate Shepherd to His Love**"

B. "The Passionate Shepherd to His Love" was written by this 16th-century English poet and playwright.

Answer: Christopher **Marlowe**

C. After Christopher Marlowe died, this man—who translated Homer's works into English—finished Marlowe's poem *Hero and Leander [lee-AN-dur]*.

Answer: George **Chapman**

5. The first U.S. law with this term in the title was named for John Sherman and passed in 1890.

A. Give this term for laws that block anti-competitive agreements and monopolies.

Answer: **anti-trust** laws or **anti-trust** acts

B. In 1914, the Sherman Antitrust Act was clarified by the Federal Trade Commission Act and an act named for this Alabama Congressman.

Answer: Henry (De Lamar) **Clayton** (Jr.)

C. In 1904, the U.S. Supreme Court upheld the Sherman Antitrust Act after Teddy Roosevelt ordered the breakup of this railroad trust.

Answer: **Northern Securities** Company

6. The title character of this novel walks with a limp because he steered a sled into a tree.

A. Name this novel set in Starkfield, Massachusetts.

Answer: ***Ethan Frome***

B. This author wrote *Ethan Frome* and *The Age of Innocence*.

Answer: Edith **Wharton** [or Edith Newbold **Jones**]

C. The narrator of *Ethan Frome* often sees the title character at this location in Starkfield around noon.

Answer: **post office**

7. The formula named for this mathematician is often extended to find roots of complex numbers.

A. Identify this mathematician whose namesake formula gives an easy way to raise complex numbers to powers if the numbers are written in polar or "cis" form.

Answer: Abraham **De Moivre** [**duh mwahv**-ruh]

B. Find the value of i raised to the eighth power.

Answer: **1** (plus $0i$)

C. The cube root of -8 has three values. Give the one whose real and imaginary parts are both positive.

Answer: **1 plus root 3 *i*** or **1 plus *i* root 3** [accept square **root** of **3** or **radical 3** in place of **root 3**]

8. This poem states "The paths of glory lead but to the grave."

A. Name this poem that begins "The Curfew tolls the knell of parting day."

Answer: **"Elegy Written in a Country Churchyard"**

B. This poet wrote "Elegy Written in a Country Churchyard" as well as "Ode on a Distant Prospect of Eton College".

Answer: Thomas **Gray**

C. After describing some people whose bodies are buried, "Elegy Written in a Country Churchyard" states that this quality should not "mock their useful toil."

Answer: **ambition** [accept being **ambitious**]

9. This person was the chancellor from 1949 to 1963.

A. Name this first leader of West Germany.

Answer: Konrad (Hermann Joseph) **Adenauer** [KOHN-raht **AH-duh-"now"-ur**]

B. Adenauer headed the Prussian State Council for most of the time between 1918 and 1933, when Germany was organized as a republic named for this city where its constitution was signed.

Answer: **Weimar** [**"VIE-mar"**], Thuringia [accept **Weimar** Republic]

C. Adenauer was succeeded by this person who had disagreed with him while being his minister of economic affairs and vice-chancellor.

Answer: Ludwig (Wilhelm) **Erhard**

10. This quantity equals the amount of a good that consumers are willing and able to purchase.

A. Name this quantity often contrasted with supply.

Answer: **demand**

B. The y-axis on a demand curve typically represents this quantity. The x-axis represents the quantity of a good.

Answer: **price** [do not accept "cost"]

C. Consumer demand curves are sometimes generated using these curves that link combinations of quantities that consumers consider to have equal values.

Answer: **indifference** curves

11. The protagonist of this musical, Tevye [TEV-yuh], sings "All day long I'd biddy-biddy-bum, if I were a wealthy man."

A. Name this musical about Jews living in a Russian shtetl [SHTEH-tul].

Answer: ***Fiddler on the Roof*** [prompt on ***Fiddler***]

B. Yente [YEN-teh] plays this role in *Fiddler on the Roof*. Three of Tevye's daughters sing a song whose title is this word repeated.

Answer: **matchmaker**

C. This is the name of the shtetl where the musical is set. This name is also the title of the last song of the musical.

Answer: **Anatevka** [**an-uh-TEV-kuh**]

12. The primary type of this tissue comes from the pro·cambium [proh-KAM-bee-um], while the secondary type comes from the vascular cambium.

A. Name this plant tissue that takes water and nutrients from the roots to the rest of the plant.

Answer: **xylem** [**ZY-lem**]

B. These xylem cells are longer than vessel elements and are used to convey water and salts.

Answer: **tracheid**s [**TRAY-kee-id**z]

C. In trees, water conduction takes place in this wood that is between the heartwood and the bark.

Answer: **sapwood** [or **alburnum**]

13. This book-length essay states "We are truly different. And we are truly alone."

A. Name this book that also states "The word 'death' is not pronounced in New York, in Paris, in London, because it burns the lips. The Mexican, in contrast, is familiar with death."

Answer: *The* ***Labyrinth of Solitude*** [or *El* ***laberinto de la soledad***]

B. This Mexican poet wrote *The Labyrinth of Solitude*. As a teenager, he published the collection *Luna Silvestre*.

Answer: Octavio **Paz** (Lozano)

C. In this book, Octavio Paz discusses both going to the ruins in Galta in India and the god Hanuman.

Answer: *The* ***Monkey Grammarian*** [or *El* ***Mono Gramático***]

14. There is disagreement as to whether or not apes should be considered this type of animal.

A. Give the common name for most primates, but not humans or lemurs [LEE-murs].

Answer: **monkey**s

B. Bonobos [buh-NOH-bohz] and these great apes are believed to be the closest living relatives to humans. Jane Goodall ["GOOD-all"] studied these animals.

Answer: **chimp**anzees or **chimp**s

C. These monkeys, including the lion-tailed and Barbary types, are closely related to baboons. There are over one million of the crab-eating type of these monkeys.

Answer: **macaque**s [muh**"COCK**S"]

15. A graph of this type of polynomial can have at most two stationary points.

A. Give the name for a polynomial with degree 3.

Answer: **cubic** polynomial

B. Find the x-coordinates of both stationary points for the polynomial "x cubed minus $12x$".

Answer: **2** and **–2** [either order; or **plus or minus 2** or **positive and/or negative 2**]

C. Find the constant term for the cubic polynomial in which the coefficient of x cubed is 1 and whose zeroes are 1, 2, and 3.

Answer: **–6** [do not prompt on "6"]

16. The equation "E equals m c squared" was explained in Albert Einstein's paper "On the Electrodynamics of Moving Bodies".

A. The equation was developed as part of this first form of relativity theory that applies when there are inertial frames of reference.

Answer: **special** theory of relativity

B. If the square root of the quantity "1 minus beta squared" is in the denominator, then the mass in the equation represents this type of mass of a stationary object.

Answer: **rest** mass

C. If units are chosen so that the speed of light equals 1, then the square of this quantity equals energy squared minus rest mass squared. Give a one-word answer.

Answer: **momentum**

17. This person was nicknamed "the Florence Nightingale of America" and "the Angel of the Battlefield."

A. Name this founder of the American Red Cross.

Answer: (Clarissa Harlowe) "Clara" **Barton**

B. Clara Barton learned about the Red Cross when she visited this city in Europe where it is headquartered.

Answer: **Geneva**, Switzerland

C. Immediately after the Civil War, Clara Barton helped identify the remains at this location that, during the war, had been run by Henry Wirz.

Answer: **Andersonville** Prison [or Camp **Sumter**; prompt on descriptions of military **prison**s or **prisoner-of-war camp**s or **POW camp**s that do not specify either name]

18. This scientist spent part of her career as an actuarial assistant.

A. Identify this namesake of two discontinuities in the structure of the Earth, one just below the continents and another between the Earth's inner and outer core.

Answer: Inge **Lehmann**

B. Lehmann deduced properties of the Earth by studying readings of these instruments that measure earthquakes.

Answer: **seismograph**s [**"SIZE"-moh-graph**s] or **seismometer**s

C. Lehmann studied seismic ["SIZE"-mik] waves that started traveling from the epi·center towards this point on the opposite side of the Earth.

Answer: **antipode** [or **antipodal** point]

19. Rembrandt said "A painting is complete when it has the shadows of a god."

A. Name the short title often given to Rembrandt's *Militia Company of District II under the Command of Captain Frans Banninck Cocq.*

Answer: *The* ***Night Watch*** [or *De* ***Nachtwacht***]

B. In another painting, Rembrandt depicted this woman from Greek mythology naked in bed under an angel. It probably is set just before she was impregnated.

Answer: ***Danaë*** [**dan-AY-ee**]

C. One painting showing Rembrandt and his wife is sometimes titled for this character being in a brothel. In another Rembrandt painting, this character kneels and is comforted by his father.

Answer: the **Prodigal Son**

20. This function gives the product of a counting number with all of the counting numbers less than the given number.

A. Name this function often represented by an exclamation point.

Answer: **factorial** function

B. Find the number of permutations of 5 items taken 2 at a time, which equals 5 factorial divided by 3 factorial.

Answer: **20**

C. What number's factorial equals 5,040?

Answer: **7** [accept **7** factorial]