



1. This barbarian's destruction of the Burgundian city of Worms is recounted in an epic partly set at his court, the *Nibelungenlied* (NEE-bel-OON-gen-leed). This brother of Bleda was defeated when the Visigoth Theodoric I and the Roman general Flavius Aetius teamed up at the Battle of Chalons (shuh-LAHN). He was convinced to leave Italy after meeting Pope Leo I at Mantua, and was known as the "Scourge of God." Name this great leader of the Huns.

ANSWER: Attila the Hun

186--105-02101

2. Invariants named for these constructs are true after every time they are executed. A type of them whose name is prefixed with "do" checks the termination condition at the end, rather than the beginning. One can go to the beginning of one of them with the "continue" command, or leave one entirely with the "break" command. These constructs come in "while" and "for" types. Name these repeating pieces of code, an "infinite" one of which will cause a program to run forever.

ANSWER: loops [or specific answers, such as for loops or while loops]

132--105-02102

3. An author from this country wrote about a man who writes diary entries to his alternate personality. A theater troupe rehearsing *The Rules of the Game* is interrupted in a play from here called *Six Characters in Search of an Author*. Another author from here wrote about William of Baskerville's investigation of a series of murders in a medieval abbey in *The Name of the Rose*. Name this country home to Luigi Pirandello (peer-un-DELL-oh) and Umberto Eco (EK-koh).

ANSWER: Italy

121--105-02103

4. This man depicted his patron speaking and moving in his portrait bust of Scipione Borghese. He redecorated the Sant'Angelo Bridge and built the Scala Regia and baldachin as the architect for St. Peter's Cathedral. In one of his sculptures, an obelisk towers over the Danube, Ganges, Rio de la Plata, and Nile. He also sculpted a nun being pierced by a spear held by an angel. Name this Italian sculptor of the *Fountain of the Four Rivers* and the *The Ecstasy of Saint Theresa*.

ANSWER: Gian Lorenzo Bernini

030--105-02104

5. This philosopher's ideas were supported after his death by Mencius and attacked by Mozi. This man's philosophy included the idea that parent and child and ruler and minister were two of the five basic relationships. This philosopher's concept of goodness, called ren, included showing respect for elders and engaging in filial piety. Name this Chinese philosopher who worked on the Five Classics and whose sayings were collected in the *Analects*.

ANSWER: Confucius [or Kongfuzi; or Kongzi; or Kongqiu]

023--105-02105

6. A king of this name reigned for forty-five days before being killed by one of his father's concubines in a drunken stupor. Another king of this name attempted to build the Hall of a Hundred Columns and ordered the construction of the Gate of All Nations, and was ultimately betrayed by his minister Artabanus (art-uh-BAA-nus). That king of this name led his forces to defeat in the Battle of Plataea (pluh-TAY-uh) after building a pontoon bridge. Give this name of a Persian emperor who led his troops at Thermopylae (thur-MAH-puh-lye).

ANSWER: **Xerxes** (ZERK-seez)

030--105-02106

7. Eustace of Boulogne tried to convince a commander during this battle to retreat right before Eustace was severely wounded. The victors of this battle pursued the other side into the Malfosse. During this battle, a defensive position was taken by the eventual losing side on Senlac Hill. The winning commander of this battle used fake retreats to draw soldiers out, and the losing commander may be depicted dying from an arrow to the eye on the Bayeux Tapestry. Name this battle lost by Harold Godwinson to the Normans under William the Conqueror in 1066.

ANSWER: Battle of **Hastings**

023--105-02107

8. Periodic diffraction gratings were found to alter this phenomenon by Smith and Purcell, whose research led to the development of free electron lasers. The IceTop array at the IceCube Observatory uses this phenomenon to detect neutrinos. Analogous to a sonic boom, it causes the emission of a characteristic blue glow, which is often seen in nuclear reactors. It results when a charged particle travels through a medium faster than the speed of light in the medium. Identify this phenomenon named for a Russian physicist.

ANSWER: Vavilov-**Cherenkov radiation** [or Vavilov-**Cherenkov effect**]

079--105-02108

9. This type of literature was addressed to “Miss Nobody” and was written by Frances Burney. A famous author of this type of book was the Chief Secretary to the Admiralty under Charles II. Samuel Pepys (Peeps) wrote one of these in the 1600’s, describing things like the Great Fire of London. After World War II, Otto Frank edited his daughter’s type of this book describing life hiding from the Nazis. Name this literary genre in which the author writes about his or her daily activities.

ANSWER: **diary** [or **journal**]

052--105-02109

10. Scott Sakaluk studied the chase-away form of this process, whose runaway form was proposed by Fisher, and confirmed by Kirkpatrick and Lande, when high genetic covariance was present. Bateman's principle states that it is dependent on gamete investment. Bowerbirds build elaborate structures in this process, which is prevalent in polygynous (pall-IDGE-in-iss) societies. Male-male competition and female choice are the two main forms of this process. Name this process in which organisms compete for and choose mates, which can be thought of as a special case of natural selection.

ANSWER: **sexual** selection [prompt on natural **selection**]

124--105-02110

11. In the first of his *Plays Pleasant*, this author wrote about the Swiss man Bluntschli, who seeks refuge in the home of Bulgarian war hero during the Serbo-Bulgarian War. This author created a Greek scholar named Adolphe Cusins who inherits a munitions company from Andrew Undershaft. In his best-known play, Colonel Pickering bets Henry Higgins that Eliza cannot become a woman of manners. Name this Irish dramatist of *Arms and the Man*, *Major Barbara*, and *Pygmalion*.

ANSWER: George Bernard **Shaw**

190--105-02111

12. The blind King John of Bohemia fought in this conflict, and John's motto was adopted by the winner of this war's Battle of Najera (nah-HER-uh). One side in this conflict lost most of its fleet in the Battle of Sluys (SLOYZ), and the Black Prince won at Poitiers (PWAH-tee-eh) in this war. It began with Edward III's claim on a throne occupied by the House of Valois (val-WAH). Name this war during which Joan of Arc was burned at the stake, which was waged for roughly a century.

ANSWER: **Hundred Years** War [or **Guerre de Cent Ans**]

141--105-02112

13. After playing "Diminuendo and Crescendo in Blue" at the 1956 Newport Jazz Festival, this man returned to prominence. For a Carnegie Hall performance, this man wrote the jazz symphony *Black, Brown, and Beige*. This man's orchestra popularized such songs as "Mood Indigo." His signature tune was "Take the 'A' Train" and he composed "It Don't Mean a Thing (If It Ain't Got That Swing)." Name this jazz musician nicknamed "Duke."

ANSWER: Edward Kennedy "Duke" **Ellington**

052--105-02113

14. A failed conspiracy to overthrow this man was orchestrated by the Marquis of Cinq-Mars. His rival Marie de Medici was exiled to Compiegne (comp-YEN) in the "Day of the Dupes." After his death in 1642, he was succeeded by Jules Mazarin. He was criticized for allying with Protestant countries during the Thirty Years War. Identify this powerful cleric who served as Chief Minister of France under Louis XIII.

ANSWER: Cardinal **Richelieu** [or Armand Jean du **Plessis**]

145--105-02114

15. The McLaren Vale and Barossa Valley of this country are known for their shiraz wines. This country was the site of mines in the Golden Mile of its western city of Kalgoorlie. Polish explorer Pawel Strzelecki (struh-LECK-ee) was the first man to climb this country's highest peak, Mount Kosciuszko. This country's city Alice Springs is the nearest to the rock formation known as either Uluru or Ayers Rock. Name this country that is the only one to also be a continent and whose western half is mostly made up of the Outback, which is the home of many kangaroos.

ANSWER: Commonwealth of **Australia**

023--105-02115

16. One of these two divine characters sent a giant crab named Carcinus (car-KEEN-us) to attack the feet of the other. The Milky Way originated from the breast of one of these two characters after she angrily stopped suckling the other. One of these mythical beings tried to prevent the other's birth by tying up Alcmene's (alk-MEE-neeZ) legs. When that failed, she dispatched two snakes to kill the other of these characters. Name both the cow-eyed Greek goddess and the strongman she forced to perform twelve labors.

ANSWER: **Hera** and **Heracles** [or **Juno** and **Hercules**; or **Hera** and **Hercules**; or **Juno** and **Heracles**; any combination of acceptable answers may be given in either order, but do not accept or prompt if only one answer is given]

079--105-02116

17. The enzyme named after these things is absent in Cri du chat (CREE do sha) syndrome and was discovered in *Tetrahymena*. That enzyme, hTERT, adds TTAGGG to the ends of these things in humans, similar to what occurs in cancer cells. These things are subject to the end replication problem, and when very short, they lead to cellular senescence (suh-NESS-unce). The discovery of these things by Elizabeth Blackburn explained Leonard Hayflick's theory that cells could only divide a finite number of times. Identify these series of repeating nucleotides at the ends of chromosomes.

ANSWER: **telomeres**

233--105-02117

18. Johannes Brahms's third piece in this genre repeatedly references the "fate" motif of Beethoven's Fifth Symphony. Frederic Chopin wrote a piece in this genre whose third movement is a famous funeral march. Ludwig van Beethoven's pieces in this genre include the difficult "Appassionata" and one titled "quasi una fantasia" nicknamed for the moonlight on Lake Lucerne. Name these pieces for a solo keyboard instrument traditionally contrasted with rhythm-dominated toccatas.

ANSWER: **piano sonatas** [prompt on **sonatas**]

080--105-02118

19. This effect explains the results of the Rossi-Hall experiment, which measured muons reaching the surface of the Earth. By using the transverse Doppler Effect, the Ives-Stilwell experiment confirmed the existence of this effect, which is directly proportional to the Lorentz factor. This effect is the cause of a paradox in which a twin in a near-light speed rocket ship can leave and return to Earth younger than a twin who never left Earth. Name this consequence of special relativity that results in clocks "slowing" down at relativistic velocities.

ANSWER: **time dilation** [prompt on special **relativity** until it is read]

149--105-02119

20. This god's son Vali was turned into a wolf that kills Narfi, another son of this god. A goat was used by this god in order to make Skadi laugh. Heimdall and this god are fated to kill one another during Ragnarok. Frigg told this god that only mistletoe could harm her son Balder. This god's wife Sigyn (SIG-in) stays by his side to catch venom that drips towards his face, which was his punishment from the Aesir (EY-seer). Name this shape-shifting Norse god known for being an untrustworthy trickster.

ANSWER: **Loki**

023--105-02120



1. A seventy-four-minute Wilhelm Furtwangler recording of this symphony is sometimes cited as the specific reason why CDs have a seventy-four-minute playing time. Leonard Bernstein conducted a version of it at the Brandenburg Gate to celebrate the fall of the Berlin Wall. This symphony ends with lyrics referencing a "beautiful spark of divinity" and "daughter from Elysium," performed by vocalists singing words taken from Friedrich Schiller's poem "Ode to Joy." Name this final complete symphony of Ludwig van Beethoven.

ANSWER: **Choral** symphony [or **Beethoven's Ninth** Symphony; Beethoven is not needed after being mentioned; do not accept or prompt on "Ode to Joy"]

052--105-02121

2. This character notes that his friend "jests at scars that never felt a wound" and wishes he was a glove upon his lover's hand. This character is the addressee of a speech about the fairy's midwife, Queen Mab. Friar John is detained from giving this character a note, which causes him to kill Paris and take an apothecary's poison while in his lover's "crypt". Name this friend of Benvolio and Mercutio, a Montague "star-cross'd" lover of Juliet.

ANSWER: **Romeo** Montague

190--105-02122

3. One novel by this author climaxes when a falling bookcase kills Leonard Bast, who had previously had an affair with Helen Schlegel. In another of this author's novels, Lucy Honeychurch returns to Florence with George Emerson after deciding not to marry the richer Cecil Vyse. This author of *Howard's End* created Adela Quested, an Englishwoman who accuses the Indian Dr. Aziz of raping her in the Marabar Caves. Name this English author of *A Room with a View* and *A Passage to India*.

ANSWER: Edward Morgan **Forster**

080--105-02123

4. In one of this man's operas, a character steals the baby of Count di Luna, and the most famous song is performed by Azucena (ohd-zoo-CHAIN-uh) and the other gypsies. In another of this composer's operas, the title jester discovers that his daughter has been killed shortly after he hears a duke singing about fickle women. This man composed arias such as the "Anvil Chorus" and "La donna e mobile," and an opera about an Ethiopian princess. Name this Italian composer of *Il trovatore* (TROH-vuh-TOR-ey), *Rigoletto*, and *Aida* (eye-EE-duh).

ANSWER: Giuseppe **Verdi**

052--105-02124

5. In rituals involving these items, the phrase "I'had'lik neir" (luh-HOD lick-NAIR) is used. A ritual involving two of these items uses one of them to fulfill the commandment "remember" and the other to fulfill the commandment "observe." A hand is waved over these items and then used to cover the eyes by a woman who uses them at the start of Shabbat. In another Jewish holiday, these items include the "shamash," and an additional one is used on each of eight days. Identify these items which are placed in a menorah on Hannukah and lit.

ANSWER: **candles**

019--105-02125

6. This object is judged to be “more loathsome” even though its owner tries “the denial of self.” This object is created by Basil Hallward, who is murdered by his patron. It is last seen displaying “exquisite youth and beauty” as a “withered” and “wrinkled” man lies nearby with a knife in his heart. That occurs after this object is stabbed after developing an aged appearance as its subject sins and remains youthful. Name this piece of artwork that is the title object in an Oscar Wilde novel.

ANSWER: **picture of Dorian Gray** [accept synonyms for “picture” like “portrait”]

052--105-02126

7. In this story, one character praises his wife for her beef stew while she daydreams about the fancy life. Another character in this story is elated at first after receiving an invitation to a ball held by the Ministry of Education. The protagonist of this story visits Madame Forestier (for-EST-ee-ay) in order to borrow the title object. Name this short story in which Mathilde replaces the title piece of fake jewelry, written by Guy de Maupassant (GEE duh MOH-puh-sahnt).

ANSWER: "The **Necklace**" [or "La **Parure**"]

227--105-02127

8. This MLB team's ballpark has stands in left field called the Crawford Boxes. During the 1990s and early 2000s, this team's lineup included the "Killer Bs," comprised of Derek Bell, Lance Berkman, Craig Biggio, and Jeff Bagwell. Tal's Hill and a train on a track above left field are features of this team's Minute Maid Park. In 2013, this team drafted Mark Appel first overall and moved into the American League. Name this MLB team that plays the Lone Star Series against its in-state rival Texas Rangers.

ANSWER: **Houston** Astros [or Houston **Astros**]

023--105-02128

9. This thinker posited that material, formal, efficient, and final causes were present in all things. He claimed that the only non-material form was the "Prime Mover." This man suggested that "eudaemonia" could be found by pursuing moderation in a manual named after his son, the *Nichomachean Ethics*. Name this tutor of Alexander the Great and most influential philosopher of Classical Greece, who wrote the *Politics* and *Poetics*.

ANSWER: **Aristotle**

019--105-02129

10. This politician's 1971 election bid was grounded in a slogan for "eliminating poverty." She put her son in charge of an aggressive family planning program which controversially included sterilization quotas. She died en route to an interview with Peter Ustinov. Her authorization of Operation Blue Star, which was an attack on the Golden Temple of Amritsar, ultimately led to her assassination by her own Sikh bodyguards, after which she was succeeded by her son Rajiv. Identify this daughter of Jawaharlal (jah-WAH-hur-lol) Nehru and first female prime minister of India.

ANSWER: **Indira Priyadarshini Gandhi** [prompt on **Gandhi**]

189--105-02130

1. Tell me about crises in world history.

[5] What event during the Carter administration that lasted for 444 days and included fifty-two Americans being held against their will in Tehran?

ANSWER: **Iran hostage** crisis

[10] What Asian country captured the U.S. research ship the *Pueblo* in 1968?

ANSWER: **North Korea** [or **Democratic People's Republic of Korea**]

[15] In 2008, the terrorist group Lashkar e-Taiba committed a series of twelve bombing and shooting acts in what city in India?

ANSWER: **Mumbai** [or **Bombay**]

[20] David Lloyd George's government fell after what 1922 crisis in which Turkey threatened to go to war with French and British ships in the Bosphorus?

ANSWER: **Chanak** Crisis

023--105-02101

2. Give these terms from evolutionary biology.

[5] Name the process by which mutation frequencies in a population change randomly, rather than due to selection.

ANSWER: genetic **drift**

[10] Name the effect in which a small population breaking off from a larger one results in a loss of diversity.

ANSWER: **founder** effect

[15] What "trees" show the evolutionary relationships between species or other taxons?

ANSWER: **phylogenetic** tree_s

[20] What is the process of classifying species based on their evolutionary relationships, rather than using physical similarities as in Linnean classification?

ANSWER: **cladistics**

066--105-02102

3. Name these literary women.

[5] What Canadian wrote *The Handmaid's Tale* and other feminist fiction?

ANSWER: Margaret **Atwood**

[10] What is the common first name of Tom Buchanan's wife, who is Jay Gatsby's love interest, and a Ms. Miller who dies in a Henry James novel?

ANSWER: **Daisy**

[15] What beloved sister in *Little Women* dies young due to scarlet fever?

ANSWER: **Beth** March [or **Elizabeth**]

[20] What author created such fictional female characters as Topsy and Evangeline St. Clare?

ANSWER: Harriet Beecher **Stowe** [or **Beecher**]

020--105-02103

4. Name these rivers.

[5] The "White" and "Blue" meet at Khartoum to form what African river, the longest in the world?

ANSWER: **Nile** [or White **Nile**; or Blue **Nile**]

[10] What longest river in Canada rises out of the Great Slave Lake and flows northward into the Beaufort Sea?

ANSWER: **Mackenzie** River

[15] What river flows through Lake Geneva on its way southward to the Mediterranean Sea?

ANSWER: **Rhone** River

[20] What strangely named river flows through the Texas panhandle and traverses all of Oklahoma lengthwise as the longest tributary of the Arkansas?

ANSWER: South **Canadian** River

052--105-02104



Letter T

Letter S

Letter H

Letter T

[10] What author created the mischievous youth Tom Sawyer?

ANSWER: Mark **Twain** [or Samuel Langhorne **Clemens**]

[10] What magazine founded in 1923 gives out of the Person of the Year award?

ANSWER: **Time**

[10] What transition metal element found in the Earth's crust has the symbol Ti?

ANSWER: **titanium**

[10] What Italian painter was known by a nickname meaning "little dyer"?

ANSWER: **Tintoretto** [or Jacopo **Comin**; or Jacopo **Robusti**]

[10] What Verdi opera is about a courtesan named Violetta Valery?

ANSWER: *La **traviata***

[10] What animal did William Blake say was "burning bright in the forests of the night" in a poem?

ANSWER: **tiger**

[10] What city, near modern-day Mexico City, was the capital of the Aztec empire?

ANSWER: **Tenochtitlan**

[10] What DNA sequences can change their position in the genome and are known as jumping genes?

ANSWER: **transposons** [or **transposable elements**; or **TE**]

[10] What New Testament apostle was noted for his "doubting" of the resurrection of Jesus?

ANSWER: **Thomas** [or **Didymus**]

[10] What Greek hero killed bandits like Sciron and Procrustes?

ANSWER: **Theseus**

052--105-0210-3

Letter S

[10] What world leader used Sergei Kirov's assassination as the pretext for his Great Purge?

ANSWER: Joseph **Stalin** [or Iosif Vissarionovich **Stalin**; or Ioseb Besarionis Dze **Jugashvili**]

[10] The east coast of what island is home to the active volcano Mt. Etna?

ANSWER: **Sicily**

[10] What Miles Davis album includes a jazz arrangement of the "Concierto de Aranjuez?"

ANSWER: **Sketches of Spain**

[10] What transition metal has the atomic symbol Ag?

ANSWER: **silver**

[10] What term denotes the weekly day of rest in Judaism and Christianity?

ANSWER: **sabbath** [or **shabbat**]

[10] What composition by Hector Berlioz includes movements named "March to the Scaffold" and "Dream of a Witches' Sabbath?"

ANSWER: **Symphonie Fantastique**: *Episode de la vie d'un artiste ... en cinq parties* [or **Fantastic Symphony**: *An Episode in the Life of an Artist, in Five Parts*]

[10] What "Magnificent" sultan ruled the Ottoman Empire during its zenith in the 16th century?

ANSWER: **Suleiman**

[10] What poetic form has "Petrarchan" and "Shakespearean" varieties?

ANSWER: **sonnet**

[10] What nonessential organ replenishes the body's supply of red blood cells?

ANSWER: **spleen**

[10] In Catholicism, the process of canonization is required for one to be recognized as what sort of person?

ANSWER: **saint**

020--105-0210-3

Letter H

[10] What Roman Emperor suppressed the Bar Kokhba Revolt and built a wall at the limit of Roman territory in Britain?

ANSWER: **Hadrian** [or Publius Aelius **Hadrianus** Augustus]

[10] What group of poems by John Donne includes one titled “Death be not Proud”?

ANSWER: **Holy Sonnets**

[10] What principle states that, if there is a lack of evolutionary pressure, a species’ phenotypic and genotypic frequencies will remain constant?

ANSWER: **Hardy-Weinberg** principle [or **Hardy-Weinberg** Equilibrium]

[10] What is the term for the actions and sayings of Mohammad that are collected independently of the Koran?

ANSWER: **Hadiths**

[10] What anthropologist showed that it was possible for early humans to have travelled across the Pacific to South America by sailing on the raft Kon-Tiki?

ANSWER: Thor **Heyerdahl**

[10] What landscape painter painted a boat in *Breezing Up* and showed a man fighting to keep on course in *The Gulf Stream*?

ANSWER: Winslow **Homer**

[10] What current Attorney General announced a program to cut back on long prison terms for low-level drug offenders?

ANSWER: Eric **Holder**, Jr.

[10] What Caribbean nation was ruled by two dictators, members of the Duvalier family?

ANSWER: **Haiti**

[10] What British author satirized house parties in a novel about the Wimbush family, *Crome Yellow*, and wrote about John the Savage in *Brave New World*?

ANSWER: Aldous Leonard **Huxley**

[10] The ATLAS and CMS experiments have discovered what elementary particle, which gives other particles mass?

ANSWER: **Higgs** Boson

187--105-0210-3



1. A specialized type of this organelle found in plants is the site of the glyoxylate (glai-OCK-sul-ate) cycle. Acatalsia (UH-cat-uh-LAHZ-ee-uh) results when this organelle lacks a key enzyme. Most disorders involving this organelle, such as infantile Refsum disease, result from mutations in PEX genes. A sharp reduction in the number of this organelle is observed in patients with Zellweger syndrome. This organelle contains the enzyme catalase (CAT-uh-layz). For 20 points, name this organelle that decomposes its namesake compound into oxygen and water.

ANSWER: peroxisome

127--105-02101

2. In Jean-Antoine Watteau's painting *Pierrot*, a man of this profession can be seen with a donkey. A member of this profession, Franklin West, is taking notes in a painting that depicts a woman shielding her eyes. A melancholy man rests his face on his hand in Van Gogh's portrait of one of these men, Paul Gachet (guh-SHAY). In another painting, a man from this profession holds a needle near the corpse of the executed robber Aris Kindt. For 20 points, name this profession of Rembrandt's subject Nicolaes Tulp and Samuel Gross, who was depicted in a painting by Thomas Eakins.

ANSWER: doctor [or equivalents, such as physician]

030--105-02102

3. This artist used a cast of the *Apollo Belvedere* as the basis for the folded arms of a Scotsman on an icy pond. This artist painted *The Skater* while he was still Benjamin West's protege. One of his paintings includes an ornamented table leg shaped like the Roman fasces (FAH-shayz), and captures its puffy-cheeked subject just after he had put his false teeth in. His most famous painting is an unfinished canvas known as the *Athenaeum* (AA-thuh-NAY-um). For 20 points, name this artist who painted the *Lansdowne* and one-dollar bill likenesses of George Washington.

ANSWER: Gilbert Charles Stuart

020--105-02103

4. A method of root-finding named for this word is identical to Newton's method, but is used when no analytical derivative exists for the function. When two of these lines are drawn from a single point to a circle, then the length of the segment times the length of the external segment is constant. The derivative of this function of x equals this function of x times the tangent of x . For 20 points, give this word that refers to any line that passes through a curve twice.

ANSWER: secant

190--105-02104

5. This artist's "nuclear mysticism" period includes his version of the Crucifixion, which depicts Jesus on a hypercube crucifix. This artist included twenty-eight depictions of the Venus de Milo in *Hallucinogenic Toreador*. This man collaborated with Luis Bunuel on the film *An Andalusian Dog*. For 20 points, name this artist who created a painting in which ants cover the face of one of several melting clocks.

ANSWER: Salvador Domingo Felipe Jacinto Dali i Domenech, 1st Marques de Dali de Pubol

186--105-02105

6. This state has the largest sea cave in the United States, which has a two-hundred-foot elevator down to its lookout to watch Steller sea lions. This state is the westernmost of the two states that do not allow most drivers to pump their own gas. A 125-foot column inspired by Trajan's column is located in this state's city of Astoria. The Phantom Ship and Old Man of the Lake are both located in this state, where a caldera filled with water, creating Crater Lake. For 20 points, name this state in the Pacific Northwest where the Willamette Valley is located.

ANSWER: **Oregon**

023--105-02106

7. Apomixis (EY-poh-MIKE-sis), also known as a clonal version of this process, can occur in species that utilize the ZW sex-determination system. Automixis (AWE-toh-MIKE-sis) occurs when the eggs in this process do undergo meiosis. This process occurs naturally in invertebrates such as aphids, rotifers and nematodes (NEE-muh-tohdz). This form of reproduction has been observed in vertebrate species such as hammerhead sharks and Komodo dragons. For 20 points, identify this form of asexual reproduction, named from the Greek for "virgin birth," in which an unfertilized egg becomes a new organism.

ANSWER: **parthenogenesis** [prompt on asexual **reproduction**]

084--105-02107

8. The Tempo program is used to find and model these objects, which are sometimes surrounded by a plerion. An example of these objects in Virgo is surrounded by the first discovered extrasolar planets. A binary example of them was used to indirectly prove the existence of gravitational waves by Hulse and Taylor. Burnell and Hewish named the first discovered one LGM-1 and noted that its emissions were periodic. For 20 points, name these highly magnetized rotating stars that periodically emit radiation.

ANSWER: **pulsars** [or **pulsating stars**; prompt on neutron **stars**]

048--105-02108

9. The Grandfather geyser field is located in this region. The Very Large Telescope is located in the Paranal (pah-rah-NAHL) Observatory in this region. The few mammal species native to this area include a variety of grey fox, Darwin's leaf-eared mice, and the viscacha (vees-CAH-chuh). Owing to El Nino, the southern portion of this desert annually flowers between September and November. This desert is rich in copper and nitrate deposits, the latter of which sparked the War of the Pacific. For 20 points, name this driest hot desert in the world, located to the west of the Andes.

ANSWER: **Atacama** Desert

020--105-02109

10. This city besieged Saguntum to break a peace. A politician who hated this city showed its proximity by spreading fresh figs on the Senate floor, and added to the end of every speech that it "must be destroyed." This city, founded by Phoenician traders, lost at Zama to Scipio Africanus after the failure of elephants under a general from its prominent Barca family. For 20 points, name this loser of the Punic Wars to Rome that had forces commanded by Hannibal.

ANSWER: **Carthage** [or **Carthago**; or **Kart-hadasht**]

104--105-02110

11. Materials with this property exhibit a phenomenon in which heat is transferred by waves called second sound, resulting in a material with this property having the highest known thermal conductivity. In 2004, a team at Penn State first witnessed this property in a solid, which at first was thought to be a Bose-Einstein condensate. Materials with it can form a thin Rollin film and creep out of a container. This property is observed below a sharp discontinuity at 2.17 Kelvin, the lambda point. For 20 points, name this property observed when viscosity goes to zero at low temperatures.

ANSWER: **superfluidity**

064--105-02111

12. In one novel from this country, a man escapes his family living in a big city to begin an affair with the denizen of a hot springs town. Another author from this country described the arson of one of its landmarks in *The Temple of the Golden Pavilion*, and killed himself on television after staging a failed right-wing coup. A story from this country describes a girl's attempt to fold a thousand paper cranes to cure her leukemia. For 20 points, name this Asian nation.

ANSWER: **Japan** [or **Nippon**-koku; or **Nihon**-koku]

020--105-02112

13. A difference of opinion exists between using "qabd" (KAH-bid) or "sabl" (SAH-dil) positioning during one portion of this action. This action is immediately preceded by an optional "iqama" (EE-kah-mah), and one ends it by performing "tasleem" on at least one side of the body. Examples of this action include "fajr" (FAH-jur), which is performed after "suhoor" and before sunrise during Ramadan. Each "rak'ah" of this action begins with a declaration of "Allahu Akbar." For 20 points, identify this second pillar of Islam.

ANSWER: daily **prayer** [or word forms; or **salaah**; or **salaat**; or **dhuhr** until "fajr" is read; or **asr** until "fajr" is read; or **maghrib** until "fajr" is read; or **isha** until "fajr" is read; or **fajr** until it is read]

189--105-02113

14. Crossdating these things is commonly done with a skeleton plot. Portions of these structures that occur early in a season are typically lighter than portions later in a season, allowing for visual identification of their boundaries. These things are the primary object of interest in the field of dendrochronology. Because the width of these things varies mostly as a result of precipitation, they can be used to construct past precipitation records. For 20 points, identify these patterns visible in a cross-section.

ANSWER: tree growth **rings**

066--105-02114

15. This concept is the first word in the title of a Sigmund Freud book that explains why the homosexual Dora feels revolted by Herr K. The "latent" form of this concept results from exposure to the conditioned stimulus before beginning a classical conditioning experiment. Clark Hull theorized a "reactive" form of this concept. If an animal learns that the presence of a conditioned stimulus signifies the lack of the unconditioned stimulus, this form of conditioning is said to have occurred. For 20 points, name this suppression of behavior that is contrasted in conditioning with excitation.

ANSWER: **inhibitions** [or **inhibitory**]

003--105-02115

16. This character insults a "miserable, tub-trading" group of people as "sniveling cowards with their longbows and black arrows." This character was wounded by Girion, a ruler of Dale, whom he then killed. Another character talks to this creature and calls him "the Stupendous" and "the Unassessably Wealthy." At the end of a 2013 film, this creature, voiced by Benedict Cumberbatch, leaves Lonely Mountain and heads toward Lake Town. For 20 points, name this dragon from *The Hobbit* series.

ANSWER: **Smaug**

023--105-02116

17. This composer's Symphony Number 4 in D minor opens with a fast movement marked *Lebhaft* (LAYB-hoft). This composer was confined to an asylum after throwing himself into the Rhine in a failed suicide attempt brought on by syphilis. This composer included "Traumerei" (TROW-mer-ai) in a set of piano pieces called "Scenes from Childhood." This composer's first symphony is nicknamed the "Rhenish." For 20 points, name this German composer who wrote a number of famous pieces for his wife, Clara Wieck.

ANSWER: Robert **Schumann**

080--105-02117

18. This thinker believed that sympathy works by turning "ideas" of another person's passion into what he called "impressions" in the mind. Summaries of this man's work ended the "dogmatic slumber" of Immanuel Kant. He allowed induction only in the case of a "missing shade of blue" in a book drawing on his earlier *Treatise of Human Nature*. For 20 points, name this Enlightenment empiricist skeptic who wrote an *Enquiry Concerning Human Understanding* in his native Scotland.

ANSWER: David **Hume**

104--105-02118

19. The derivative with respect to particle number of a quantity named for this scientist gives the chemical potential. A law named for this scientist states that the number of constituents minus the number of phases plus two equals the degrees of freedom. For spontaneous reactions, the change in his namesake quantity is negative; that namesake quantity is calculated as enthalpy minus quantity temperature times entropy. For 20 points, identify this American chemist who lends his name to a type of free energy.

ANSWER: Josiah Willard **Gibbs**

127--105-02119

20. This goddess pulled a handful of hair out of the chest of Brontes after he placed her on his knee. This goddess killed the giants Otus and Ephialtes by tricking them into throwing a spear at each other. This goddess sent a boar to rampage through Calydon. Actaeon was transformed into a stag after he witnessed her bathing in a stream, and Leto gave birth to this goddess on Delos with her brother. For 20 points, name this Greco-Roman goddess of the hunt.

ANSWER: **Artemis** [or **Diana**]

227--105-02120



1. A specialized type of this organelle found in plants is the site of the glyoxylate (glai-OCK-sul-ate) cycle. Acatasia (UH-cat-uh-LAHZ-ee-uh) results when this organelle lacks a key enzyme. Most disorders involving this organelle, such as infantile Refsum disease, result from mutations in PEX genes. A sharp reduction in the number of this organelle is observed in patients with Zellweger syndrome. This organelle contains the enzyme catalase (CAT-uh-layz). For 20 points, name this organelle that decomposes its namesake compound into oxygen and water.

ANSWER: peroxisome

127--105-02131

2. In Jean-Antoine Watteau's painting *Pierrot*, a man of this profession can be seen with a donkey. A member of this profession, Franklin West, is taking notes in a painting that depicts a woman shielding her eyes. A melancholy man rests his face on his hand in Van Gogh's portrait of one of these men, Paul Gachet (guh-SHAY). In another painting, a man from this profession holds a needle near the corpse of the executed robber Aris Kindt. For 20 points, name this profession of Rembrandt's subject Nicolaes Tulp and Samuel Gross, who was depicted in a painting by Thomas Eakins.

ANSWER: doctor [or equivalents, such as physician]

030--105-02132

3. This artist used a cast of the *Apollo Belvedere* as the basis for the folded arms of a Scotsman on an icy pond. This artist painted *The Skater* while he was still Benjamin West's protege. One of his paintings includes an ornamented table leg shaped like the Roman fasces (FAH-shayz), and captures its puffy-cheeked subject just after he had put his false teeth in. His most famous painting is an unfinished canvas known as the *Athenaeum* (AA-thuh-NAY-um). For 20 points, name this artist who painted the *Lansdowne* and one-dollar bill likenesses of George Washington.

ANSWER: Gilbert Charles Stuart

020--105-02133