



1. During the thirteenth century, this country's Alexander III removed Norse influence by defeating Haakon IV and signing the Treaty of Perth. This country formed the Auld Alliance with France. Edward Balliol briefly ruled this country, although the Treaty of Northampton had earlier recognized this country's independence. A defining moment for this country was its victory against (\*) Edward II at the Battle of Bannockburn. For 10 points, name this country whose independence was fought for by Robert the Bruce and William Wallace.

ANSWER: Scotland

140-13-75-08101

2. A ring in which this operation is defined for all nonzero elements is a field. Taking the limit of an expression containing two functions connected by this operation can be done with L'Hopital's rule. One variant of this operation that can be done with a monic linear polynomial is its (\*) synthetic variety. Like subtraction, this operation is not commutative over the real numbers. The result of this operation is the quotient. For 10 points, name this inverse operation of multiplication.

ANSWER: division

131-13-75-08102

3. This thinker argued that a man may make acorns his own property by expending labor in collecting them. In another work, he claimed there are "no innate principles" in children but that people develop ideas through sensing "secondary qualities." The (\*) Declaration of Independence was influenced by this man's notion that government exists to protect "life, liberty, and estate." For 10 points, name this philosopher who wrote *Two Treatises of Government*.

ANSWER: John Locke

121-13-75-08103

4. This film opens with a close-up of a worm, followed by a zoom-out showing the worm being placed on a hook. One character in this film sings "Mist and shadow, cloud and shade, all shall fade" in a scene that cuts from a volley of arrows to a mouth dripping with red juice. This movie won eleven (\*) Academy Awards, which Billy Crystal joked was "one for each ending." Its climactic moments include Eowyn's slaying of the Witch-King and Gollum's fall into Mount Doom. For 10 points, name this final movie in Peter Jackson's *Lord of the Rings* trilogy.

ANSWER: *The Lord of the Rings: The Return of the King*

080-13-75-08104

5. In one short story by this author, a wizard creates a fireproof boy only to discover that he was made by someone else's dream. This author wrote another story in which Carlos Daneri's home contains the title point in space that contains all other points. In another story by this author of "The (\*) Circular Ruins" and "The Aleph," the spy Yu Tsun discovers that the title book was written by his ancestor Ts'ui Pen before he murders Stephen Albert. For 10 points, name this blind Argentinian author of "The Garden of Forking Paths."

ANSWER: Jorge Luis Borges

186-13-75-08105

6. **This man's last purely instrument work was a clarinet concerto intended for Anton Stadler. This composer's four horn concertos are some of many works in which he revealed his bizarre fondness for scatological jokes. Ludwig Köchel catalogued this man's music, creating the "K number" still used for naming his works. Franz (\*) Süßmayr finished the piece he was working on before his death, this man's requiem. For 10 points, name this Austrian composer of *Eine kleine Nachtmusik* (EYE-nuh KLIE-nuh NOCT-moo-zeek).**

ANSWER: Wolfgang Amadeus Mozart

121-13-75-08106

7. **In one poem by this author, the speaker recalls a wise man who told him, "Give crowns and pounds and guineas but not your heart away." This author wrote a poem where the title figure is said to "eat your victuals fast enough." In another poem, this author of "When I Was (\*) One-and-Twenty" reminds the title figure of when people "chaired you through the market-place" after "you won your town the race." For 10 points, name this British poet of the collection *A Shropshire Lad*, including "Terence, This Is Stupid Stuff" and "To an Athlete Dying Young."**

ANSWER: A. E. Housman [or Alfred Edward Housman]

140-13-75-08107

8. **In meteorology, a modification to this equation is known as the Magnus-Tetens approximation. Another modification of this equation features the term B over T+C and is called the Antoine equation. It can be derived by assuming the difference in Gibbs free energy between two points are the same, and can be written with the right hand side as latent heat over temperature times (\*) volume change. This equation gives the slopes of the tangents to the coexistence curve. For 10 points, name this equation that characterizes pressure and temperature along phase boundaries.**

ANSWER: Clausius-Clapeyron relation

201-13-75-08108

9. **In the background of this painting, a steamship is blowing smoke while four men in white are rowing. A girl holds her mother's pink skirt in its middle, to the right of a man playing a trumpet. The artist of this painting depicted the same setting from a different vantage point in his other work, *Bathers at Asnières*. This painting's foreground features a (\*) dog sniffing the ground, a man leaning back with a pipe in his mouth, and a woman with a parasol over her shoulder holding a monkey on a leash. For 10 points, name this pointillist painting, a masterpiece by George Seurat.**

ANSWER: A Sunday Afternoon on the Island of La Grande Jatte [or *Un dimanche apres-midi a l'Île de la Grande Jatte*; or La Grande Jatte]

192-13-75-08109

10. **The first American company in this industry was named for Seneca and set up after Edwin Drake started production in Titusville. This business made a millionaire of Los Angeles's Edward Doheny, whose bribes were investigated by Thomas Walsh. An expose of this industry in *McClure's Magazine* was penned by Ida Tarbell. The federal leasing of Elk Hills to this industry caused the (\*) Teapot Dome scandal. For 10 points, name this business whose monopoly by John D. Rockefeller ran delivery lines from crude refineries.**

ANSWER: oil industry [or petroleum industry; prompt on gasoline]

104-13-75-08110

11. In this country, a form of shadow puppet theater called *wayang* is accompanied by the heptatonic *pelog* scale as mallets hit a row of tuned metal gongs. One anthropologist described a crowd here as a “superorganism” and compared Morocco’s religious practice to this country in *Islam Observed*. Ethnomusicologists love this country’s (\*) *gamelan* ensemble. In the essay *Deep Play*, Clifford Geertz describes a cockfight he saw here. For 10 points, name this country with different ethnic communities in Bali and Java.

ANSWER: Republic of Indonesia [or Republik Indonesia]

104-13-75-08111

12. Persecution against these people was intensified after a series of bills were posted at various places including on the king's bedchamber door in the Affair of the Placards. In supposed revenge for the death of Francis, duke of Guise, one of these people was targeted for assassination. That effort failing triggered a general massacre against these people called the (\*) St. Bartholomew's Day massacre. For 10 points, name these French Protestants who enjoyed toleration for a while under the Edict of Nantes.

ANSWER: Huguenots [prompt on French Protestants before read]

201-13-75-08112

13. The impedance of these components is directly proportional to angular frequency. The energy stored in these components is proportional to the current squared. Their characteristic measure is multiplied by the time derivative of current to yield the voltage. That measure can be increased by inserting a (\*) metal bar in the middle of these components. They are often found in circuits with resistors and capacitors. For 10 points, identify these circuit components that store energy in a magnetic field.

ANSWER: inductor

066-13-75-08113

14. The Ashtavinayaka (ASH-tah-vee-nie-AH-kuh) pilgrimage involves visiting eight temples dedicated to this deity. He defeated Skanda in a race despite not moving, and he served as Vyasa’s scribe as he dictated the *Mahabharata*. Commonly depicted riding a mouse, this god was frequently called the (\*) “remover of obstacles.” This god gained his famous form after his father, Shiva, decapitated him. For 10 points, name this son of Parvati who was commonly depicted with an elephant’s head.

ANSWER: Ganesh

192-13-75-08114

15. In this region, the confluence of the Sengge and Gar rivers gives rise to the Indus river. This region includes the lakes Siling and Nam. This region is often called the "roof of the world" due to its location on the highest and largest plateau in the world. (\*) Potala Palace is found in this region's capital of Lhasa. For 10 points, name this place whose namesake form of Buddhism is led by the Dalai Lama, a formerly independent monk-state that is now ruled by China.

ANSWER: Tibet

066-13-75-08115

16. This author created a character who serves six years of hard labor after getting caught writing the words, "Optimism is the opium of the people." The protagonists of another novel by this man own a dog named Karenin that dies of cancer. In that novel, Professor Franz falls in love with (\*) Sabina, who travels to America after ending her affair with Tomas. For 10 points, name this author who wrote about the Czech experience in *The Joke* and *The Unbearable Lightness of Being*.

ANSWER: Milan Kundera

186-13-75-08116

17. **One palace in this country features a Gallery of Battles and a circular room where niches in the walls hold stacks of four ornate coffins for interred monarchs. A marble fountain in this country is circle by twelve outward-facing feline sculptures spewing water in the Court of the Lions. Eighteen spires rise from an (\*) incomplete cathedral in this country whose architect died in 1926. This country is home to a complex whose name means “Red Fort” in Arabic. For 10 points, name this home of the Escorial, Antonio Gaudi’s Sagrada Familia, and the Muslim-built Alhambra in Granada.**

ANSWER: Kingdom of Spain [or Reino de España]

104-13-75-08117

18. **This character loses a tooth which he trades to his friend for a tick. With Ben Rogers, Tommy Barnes, and Joe Harper, he starts a gang of robbers with a blood oath initiation ritual. While attempting a wart removal ritual with a dead cat, he witnesses the murder of (\*) Muff Potter in a graveyard. Later, he wanders off after a picnic and gets lost in McDougal’s Cave with Becky Thatcher. In one episode, this antagonist of Injun Joe tricks his friends into painting a fence for him. For 10 points, name this friend of Huck Finn in the novels of Mark Twain.**

ANSWER: Tom Sawyer [or Tom Sawyer]

015-13-75-08118

19. **A large fold of the peritoneum called the greater omentum hangs down from this organ. In this organ’s upper region, called the fundus, chief cells secrete pepsinogen (pep-SIN-oh-jen) and parietal cells secrete intrinsic factor and (\*) hydrochloric acid. The pyloric sphincter at the bottom of this organ passes a substance called chyme into the duodenum (doo-AH-den-um) of the small intestine. For 10 points, name this digestive organ, into which food is passed by the esophagus.**

ANSWER: stomach

014-13-75-08119

20. **This man was wounded while fighting with Archie Clement, which followed a time when he took part in the Centralia massacre under Bloody Bill Anderson. This man took on the pseudonym Thomas Howard while trying to avoid the bounty put on his head by Thomas Crittenden. This man, who was killed by Robert Ford, barely escaped from Northfield, Minnesota, after one action, and he was part of a group with (\*) Cole Younger and his brother Frank. For 10 points, name this Reconstruction-era bank-robbing outlaw from Missouri.**

ANSWER: Jesse Woodson James

023-13-75-08120

21. **One type of these creatures is induced by chrionic gonadotropin from pregnant humans to lay millimeter-wide eggs; that model organism in development labs, *Xenopus laevis*, has clawed feet. High thyroxine concentrations in the back of these animals cause their jaws to deform and their tails to (\*) disappear. These animals of order Anura include a family which warns of its batrachotoxin emissions with bright colored skin, the “poison dart” type. For 10 points, name these reptiles whose amphibious stage is the tadpole.**

ANSWER: frogs [or toads or tadpoles; prompt on amphibians]

104-13-75-08121

22. In one poem by this author, the speaker laments a dearth of colorful nightgowns and describes an “old sailor” who “catches tigers in red weather.” Another of his poems concludes by describing pigeons flying “downward to darkness, on extended wings.” This poet of “Disillusionment of (\*) Ten O’Clock” created a character who wishes for “concupiscent curds” of the title substance to be whipped by “the roller of big cigars.” For 10 points, name this American poet of the collection *Harmonium*, including “Sunday Morning” and “The Emperor of Ice-Cream.”

ANSWER: Wallace Stevens

014-13-75-08122

23. This ruler ended one conflict with France through the Peace of Crepy. After this ruler's forces won the Battle of Villalar over the rebellious comuneros, this monarch had his mother, Joanna the Mad, confined inside the Convent of Santa Clara. This ruler convoked and presided over the Diet of Worms. In 1556, this man entered a monastery, allowing his brother Ferdinand I to succeed him in one position while his son (\*) Philip II took over Spain. For 10 points, name this influential Holy Roman Emperor.

ANSWER: Charles V of the Holy Roman Empire [or Charles I of Spain; prompt on Charles]

014-13-75-08123



1. In one work by this man, Olunde commits suicide in a ritual his father, Elesin, failed to follow because of the intervention of Simon Pilkings. For 10 points each:

[10] Name this Nobel Prize-winning playwright of *Death and the King's Horseman*.

ANSWER: Wole **Soyinka** [or Akinwande Oluwole **Soyinka**]

[10] Wole Soyinka is a writer from this West African country, which is also the home of Chimamanda Ngozi Adichie.

ANSWER: Federal Republic of **Nigeria**

[10] This Soyinka play recounts the contest for the hand of Sidi between Baroka and the schoolteacher Lakunle.

ANSWER: *The **Lion and the Jewel***

023-13-75-08201

2. Solar wind creates the most distinctive features of these objects. For 10 points each:

[10] Identify these icy objects that can display a tail.

ANSWER: **comets**

[10] Long-period comets are thought to originate in the Oort cloud while short-period ones are thought to originate from this region of the Solar System.

ANSWER: **Kuiper belt**

[10] These "refugees" from the Kuiper belt are found between Jupiter and Neptune. They have unstable orbits and their largest example is Chiron.

ANSWER: **centaurs**

066-13-75-08202

3. Gabrielle Giffords created the PAC Americans for Responsible Solutions to oppose this lobbying group. For 10 points each:

[10] Name this organization whose executive vice-president, Wayne LaPierre, asserted that armed guards could have prevented the Sandy Hook shooting. This organization lobbies for the rights of gun owners.

ANSWER: the **NRA** [or the **National Rifle Association**]

[10] In a passage of disputed meaning, the Second Amendment states that the right to bear arms "shall not be infringed" on the grounds that one of these things is "necessary to the security of a free state."

ANSWER: a well-regulated **militia**

[10] In this 2010 case, the Supreme Court ruled that the right to bear arms was incorporated under the 14th amendment. It clarified the decision made in *D.C. v. Heller*.

ANSWER: **McDonald** v. *Chicago*

080-13-75-08203

4. This man defeated his father-in-law Maximian after Maximian betrayed him. For 10 points each:  
[10] Name this Roman emperor whose religious conversion helped lead to his issuing the Edict of Milan, allowing religious toleration for Christians.

ANSWER: **Constantine the Great** [or **Constantine I**; or **Flavius Valerius Constantinus**; prompt on **Constantine**]

[10] Constantine defeated Maxentius at this 312 CE battle, before which Constantine adopted the Chi Rho as a symbol for his army.

ANSWER: Battle of the **Milvian Bridge**

[10] This Roman emperor co-authored the Edict of Milan with Constantine, but was later executed after he lost to Constantine at the Battle of Adrianople.

ANSWER: Valerius Licinianus **Licinius**

023-13-75-08204

5. This composer used quotations from Donne's "The Sun Rising" and Shelley's *Prometheus Unbound* as some of the epigraphs for his five-movement *Sinfonia antartica*. For 10 points each:

[10] Name this British composer of *Fantasia on "Greensleeves"* and *Fantasia on a Theme by Thomas Tallis*.

ANSWER: Ralph **Vaughan Williams**

[10] This composition, the first and longest of Vaughan Williams's symphonies, sets text from *Leaves of Grass* in such movements as "On the Beach at Night, Alone" and "The Explorers."

ANSWER: A **Sea Symphony**

[10] Vaughan Williams's *Sancta Civitas* is an example of the oratorio, a genre worked in extensively by this earlier German-born British composer of *Messiah*.

ANSWER: George Frideric **Handel**

014-13-75-08205

6. This man was originally named Saul, and converted on the Road to Damascus. For 10 points each:

[10] Name this missionary who helped spread Christianity through much of the Mediterranean. His epistles form a sizable portion of the New Testament.

ANSWER: Saint **Paul** the Apostle

[10] This longest epistle by Paul comes directly after Acts in the Bible. It famously states that "the wages of sin is death" and examines sinners' salvation through Christ.

ANSWER: Epistle to the **Romans**

[10] This other epistle advocates against marrying non-Christians by saying "be ye not unequally yoked with unbelievers." It comes after a similarly-named epistle which states, "Love is patient, love is kind."

ANSWER: **Second Corinthians** [do not accept or prompt on "Corinthians" or "First Corinthians," but do accept equivalents such as **Corinthians 2**]

192-13-75-08206

7. This poem includes the warning, “Beware! Beware! His flashing eyes, his floating hair!” For 10 points each:

[10] Name this poem in which the title ruler decrees a “stately pleasure dome” in Xanadu.

ANSWER: “**Kubla Kahn**”

[10] “Kubla Kahn” was written by this opium-addled poet. He teamed up with Wordsworth on *Lyrical Ballads*.

ANSWER: Samuel Taylor **Coleridge**

[10] Coleridge was given a 150-pound annuity by this family so he could focus on his poetry. Its patriarch Josiah started a namesake pottery company and was a prominent abolitionist.

ANSWER: **Wedgwood**

015-13-75-08207

8. Answer these questions about the United States's failure to ratify the Treaty of Versailles, for 10 points each.

[10] This Democratic President's "Fourteen Points" influenced the Treaty of Versailles, which he helped draft. He led America into World War I.

ANSWER: Thomas Woodrow **Wilson**

[10] Henry Cabot Lodge, a Republican Senator from this state, led the opposition to Wilson. A concurrent police strike in this state challenged its then-governor, Calvin Coolidge.

ANSWER: **Massachusetts**

[10] Wilson suffered this health problem in October 1919, which his wife and doctor Cary Grayson hid from the country while the ratification process soured.

ANSWER: **stroke** [or cerebral **hemorrhage**; or retinal **hemorrhage**]

104-13-75-08208

9. A yellow one, lead iodide, is formed when lead nitrate solution is mixed with sodium iodide. For 10 points each:

[10] Name these solid compounds which drop out of solution in double-replacement reactions.

ANSWER: **precipitates**

[10] In the reaction, the sodium and nitrate ions are classified as this type of species. These ions do not participate in double replacement reactions.

ANSWER: **spectator** ions

[10] To determine if a precipitate will form, the mass action expression is used to calculate whether this equilibrium constant, modeling the dissolution of an ionic solid, is greater than the reaction quotient.

ANSWER: **solubility product** constant [or **K<sub>sp</sub>**]

190-13-75-08209

10. This novel is dedicated to “sixty million and more” in a nod to the number of people who died in the trans-Atlantic slave trade. For 10 points each:

[10] Name this novel in which Sethe kills her own daughter to prevent her from experiencing a life of slavery.

ANSWER: **Beloved**

[10] *Beloved* was written by this African American Nobel laureate who has also written *The Bluest Eye* and *Sula*.

ANSWER: Toni **Morrison** [or Chloe Anthony **Wofford**]

[10] In this Biblically named Morrison novel, Milkman Dead III grows apart from his friend Guitar Bains and visits Shalimar, Virginia.

ANSWER: **Song of Solomon**

015-13-75-08210

11. Several characters in this novel pass around Kemmerich's boots after his death. For 10 points each:  
[10] Name this novel in which Corporal Himmelstoss is assaulted by Paul Baumer, a demoralized soldier on the German front lines in World War I.

ANSWER: **All Quiet on the Western Front** [or **Im Westen Nichts Neues**]

[10] This author of *All Quiet on the Western Front* had his books burnt publicly by the Nazis for their unpatriotic and anti-war messages.

ANSWER: Erich Maria **Remarque**

[10] In *All Quiet on the Western Front*, this teacher's patriotism inspires Paul and his friends to sign up for the war, though he himself does not fight until being drafted.

ANSWER: **Kantorek**

104-13-75-08211

12. This military leader's campaigns in Ireland included a massacre at Drogheda. For 10 points each:  
[10] Name this Lord Protector of England who commanded the New Model Army while serving the Roundheads in the English Civil War.

ANSWER: Oliver **Cromwell**

[10] This English king was executed after the English Civil War. He appointed William Laud as Archbishop of Canterbury.

ANSWER: **Charles I** [prompt on **Charles**]

[10] After the dissolution of the Rump Parliament, this parliament came to power, lasting only six months. It was composed entirely of Cromwell's handpicked representatives.

ANSWER: **Barebone's** Parliament [or **Little** Parliament; or **Nominated Assembly**; or Parliament of **Saints**]

192-13-75-08212

13. A scene in Dr. Bartolo's home in this opera begins with the aria "Una Voce (VOE-che) Poco Fa." For 10 points each:

[10] Name this opera in which the title character sings the aria "Largo al Factotum." It ends with a marriage contract signed between Count Almaviva and Rosina.

ANSWER: **The Barber of Seville** [or **Il Barbiere di Siviglia**]

[10] *The Barber of Seville* was composed by this Italian whose *La Cenerentola* (CHE-neh-REN-toh-lah) includes the stepsisters Clorinda and Tisbe.

ANSWER: Gioachino **Rossini**

[10] This Rossini opera is based on a play by Friedrich Schiller. In it, the title character shoots an apple above Jemmy's head.

ANSWER: **William Tell** [or **Guillaume Tell**; or **Guglielmo Tell**]

030-13-75-08213

14. This god impregnated Danae by turning into a shower of gold. For 10 points each:

[10] Name this husband of Hera and chief of the Olympians.

ANSWER: **Zeus**

[10] This mother of Zeus tricked his father Cronus into swallowing a rock instead of the infant Zeus.

ANSWER: **Rhea**

[10] This Titaness came up with the plan to get the other children out of Cronus' stomach. After sleeping with her, Zeus realized their child could overthrow him and swallowed her in the form of a fly.

ANSWER: **Metis**

186-13-75-08214

15. For 10 points each, answer these questions about a block travelling down a ramp.

[10] This contact force counteracts the component of gravitational acceleration perpendicular to the ramp.

ANSWER: **normal** force

[10] The normal force on the block equals this function of the angle of the ramp, times the object's mass, times gravitational acceleration.

ANSWER: **cosine** of the angle [or **cos**]

[10] Suppose the block was replaced with a solid ball that rolled down the ramp. The ball's linear acceleration of  $g$  times the sine of the angle would then be divided by quantity 1 plus what constant in the formula for a sphere's moment of inertia?

ANSWER: **two-fifths** [or **.4**]

104-13-75-08215

16. This sculptor depicted six leaders of the title city preparing to be executed by Edward III in *The Burghers of Calais*. For 10 points each:

[10] Name this French sculptor of *The Gates of Hell* as well as a famous depiction of Paolo and Francesca called *The Kiss*.

ANSWER: Auguste **Rodin**

[10] Rodin may be most famous for this bronze sculpture, probably of Dante, who sits on a rock and rests his chin on the back of his right hand.

ANSWER: *The **Thinker*** [or *Le **Penseur***]

[10] Rodin sculpted a controversial monument to this novelist, whom he portrayed wrapped in a long flowing cloak and a grotesque and undetailed face.

ANSWER: Honore de **Balzac**

014-13-75-08216

17. This ethnic group conquered the Khwarezmian Empire, but was defeated at Ain Jalut. For 10 points each:

[10] Identify this group that was united in the thirteenth century by Genghis Khan.

ANSWER: **Mongols**

[10] Under Kublai Khan, the Yuan Dynasty defeated this Chinese dynasty, which developed the first compass and used gunpowder. It followed the Tang dynasty.

ANSWER: **Song** Dynasty

[10] This portion of the Mongol empire was ruled from Sarai by Batu Khan, who was its founder. It was named for the characteristic of a certain tent.

ANSWER: **Golden Horde** [or the **Kipchak Khanate**; or **Ulus Juchi**]

189-13-75-08217

18. This man is assisted by Renfield, who is labeled a zoophagous maniac by John Seward. For 10 points each:

[10] Name this title character who is first met by Jonathan Harker in the Carpathian Mountains before he heads to England.

ANSWER: Count **Dracula**

[10] *Dracula* was written by this Irish author.

ANSWER: Bram **Stoker** [or Abraham **Stoker**]

[10] This man is called in by John Seward when Lucy Westenra takes ill, and he is the first to organize a fight against Dracula.

ANSWER: Abraham **Van Helsing** [or **Abraham** Van Helsing]

023-13-75-08218

19. These plants rely on pollination in order to reproduce. For 10 points each:

[10] Name this group of plants, which grow flowers and produce fruit after fertilization.

ANSWER: **angiosperms** [prompt on "flowering plants"]

[10] This type of angiosperm is characterized by parallel leaf veins and randomly arranged stem vascular bundles. These plants cannot produce wood.

ANSWER: **monocots**

[10] After fertilization, the embryo in a seed is surrounded by this layer that is enclosed by the seed coat. This layer provides the embryo with nutrients.

ANSWER: **endosperm**

140-13-75-08219

20. This river rises in the Krkonose (KUR-ko-nose) Mountains in the Czech Republic. For 10 points each:

[10] Name this river that travels west and north through Germany into the North Sea.

ANSWER: **Elbe** River [or **Labe**]

[10] This "Florence of the Elbe" sits near the German border with the Czech Republic, and had to rebuild much of its inner city after it was firebombed in World War II.

ANSWER: **Dresden**

[10] This port city on the Elbe is one of three German city-states, along with Bremen and Berlin.

ANSWER: **Hamburg**

023-13-75-08220

21. Leonhard Euler showed that "e" raised to the power of this number times pi equals negative 1. For 10 points each:

[10] Name this number defined as the square root of negative 1.

ANSWER: **i** [or **imaginary unit**]

[10] Complex numbers whose real parts are equal and whose imaginary parts differ only by a sign change have this relationship.

ANSWER: they are complex **conjugates**

[10] If a complex number is expressed in polar form as "r times e to the power of x," what variable must change sign to obtain the conjugate?

ANSWER: **x** [or the **exponent** of e; or the **power** of e; or obvious equivalents]

121-13-75-08221