Question #1: Fine Arts

10 points

This artist depicted the Cerro Pedernal [SAIR-oh ped-air-nahl] mesa below a turquoise sky in a painting showing a wooden ladder floating in the air. That work is *Ladder to the Moon.* Another painting by this artist is a view from below of a ponderosa ["ponder"-OH-sah] pine tree that mostly blocks out the starry sky, and is named for its setting on the D. H. Lawrence Ranch in New Mexico. A series of paintings by this artist, inspired by her view from an airplane, depicts white patches and is called *Sky Above Clouds.* Name this American painter who often depicted flowers and animal skulls.	Georgia (Totto) **O'Keeffe**

Question #2: Social Studies

10 points

Violent resistance to integration in this city caused a part of Center Street to be nicknamed "Dynamite Hill". In 1956, dynamite was used in an unsuccessful assassination attempt against one of this city's ministers, Fred Shuttlesworth, who later launched Project C in this city. This city's Commissioner of Public Safety, Bull Connor, responded to protests with fire hoses and attack dogs. In 1963, dynamite placed at this city's 16th Street Baptist Church killed four African-American girls. Martin Luther King Jr. wrote a famous letter when he was being held in this city's jail. Name this city in Alabama.	**Birmingham**, Alabama

Question #3: Mathematics

10 points

The Gauss-Lucas [loo-kah] theorem relates the solutions of this kind of function to the solutions of its derivative. A Vandermonde matrix can be used to fit this type of function to a set of points. The error when this kind of function is used to approximate any differentiable function is described by Taylor's theorem. A rational function consists of one function of this type divided by another function of this type. The fundamental theorem of algebra describes the zeroes of this kind of function. Name this type of function that can be classified by degree into categories like quadratic, cubic, and quartic.	**polynomial**s or **polynomial** functions

Question #4: Literature

10 points

This author wrote a short story in which Mr. Waythorn, the third husband of Alice Varick, gets along with her ex-husbands, who are called "The Other Two". In a novel by this author, the narrator hires a man at the post office as his driver, calling him "the most striking man in Starkfield". In another novel by this author, the pregnancy of May Welland causes Newland Archer to abandon his affair with Countess Ellen Olenska. One of this author's title characters has a "smash-up" with Mattie Silver by steering a sled into a tree. Name this author of *The Age of Innocence* and *Ethan Frome*.	Edith (Newbold **Jones**) **Wharton** [accept either underlined name]

Question #5: Science

10 points

This organelle contains most of the substance used to turn animal hides into leather, which is taken from trees and called tannin [TAN-in]. The membranes around these organelles are tonoplasts ["TONE"-oh-plasts]. In paramecia ["pair"-uh-MEE-see-uh], one of these organelles ruptures after coming in contact with the anal pore, which occurs after digestion in this structure. Though one of these organelles can take up most of the volume of a plant cell, it is common for animal or meristem ["MARE-uh-stem"] cells to have many small ones. In protists, these organelles contract to regulate the amount of water in the cell. Name these vesicles with a high concentration of sugars, salts, and enzymes that provide turgor pressure in plants.	**vacuole**s [VAK-yoo-ohlz] [prompt on **vesicle**s before "vesicles"]

Question #6: Social Studies

10 points

One city in this non-U.S. state annually celebrates the 1810 marriage of its king in Theresa's Meadow. This state's 19th-century Neuschwanstein [NOYSH-vahn-shtyn] Castle was built for its King Ludwig II. An annual festival dedicated to the works of Richard Wagner [REEK-hart VAHG-nur] is held in the city of Bayreuth [BY-roit] in this state. A lion symbolizing this region stands next to a lighthouse in Lindau harbor on Lake Constance, which borders Baden-Württemberg [BAH-den VUR-tem-bairk], Austria, Switzerland, and this German state. Name this southwestern German state whose capital is Munich [MYOO-.nik].	**Bavaria** or **Bayern** [prompt on (Federal Republic of) **Germany** or (Bundesrepublik) **Deutschland**]

Question #7: Mathematics

10 points per part

	This problem was also known as the Delian problem.	
1	Name this classical construction problem that involved volumes. It was eventually shown to be impossible.	**doubling the cube** [accept any reasonable answer containing **cube** and the idea of **double** or **twice** the volume of an original cube]
2	The Delian problem is equivalent to starting with a segment that is one unit long and drawing a segment with this length.	**cube**(d) **root of 2** or $2^{1/3}$ [do not prompt on "root 2"]
3	This 19th-century French mathematician proved that both doubling the cube and trisecting a general angle were impossible.	Pierre (Laurent) **Wantzel**

Question #8: Mathematics

10 points per part

	There are 17 basic patterns of this type in two dimensions.	
1	Give this term for covering a plane without spaces or overlaps.	**tessellation**(s) or **tessellate** or **tessellating** [accept **tiling**(s)]
2	This 20th-century British scientist is the namesake of a non-translationally-symmetric tessellation made of kites and darts.	Roger **Penrose**
3	A regular polygon tessellates the plane if and only if the measure of one of its interior angles is a factor of this number.	**360** degrees or **2 pi** radians

Question #9: Literature

10 points per part

	This dramatist reimagined Adolf Hitler as the Chicago gangster Arturo Ui [wee].	
1	Name this German playwright who told of a woman losing her children in the Thirty Years' War in *Mother Courage and her Children.*	(Eugen) Bertolt (Friedrich) **Brecht** [BAIR-tolt brekt]
2	In this other work by Bertolt Brecht, the judge Azdak rules that Grusha is the mother of Michael after she refuses to pull him out of the title diagram drawn on the ground.	*The **Caucasian Chalk Circle** [or Der Kaukasische **Kreidekreis**]*
3	Bertolt Brecht also wrote a play about this character working for the industrialist Pierpont Mauler in the stockyards of Chicago.	Saint **Joan** or **Joan** Dark [or **Joan** of Arc]

Question #10: Literature

10 points per part

	This character lost an eye and an ear to syphilis he got from Paquette [pah-ket].	
1	Name this optimist philosopher who teaches "that things cannot be otherwise than as they are".	Dr. **Pangloss** [or Professor **Pangloss**]
2	Pangloss tutors this title character of a Voltaire novella.	**Candide**
3	Candide and his companion Cacambo reach El Dorado in South America and take 102 of these things to secure their wealth.	red **sheep** [prompt on **animal**s or other less specific answers]

Question #11: Social Studies

10 points per part

	The head of this cabinet department is supposed to have not been in the U.S. military for the past seven years, though waivers were granted to George Marshall and James Mattis.	
1	Name this department that oversees the United States Armed Forces.	Department of **Defense** [accept **DoD**]
2	These components of the Army and Air Force are similar to reserve forces, but they are under both state and federal control, and are often activated by governors to handle emergencies.	**National Guard** [prompt on Air **Guard** or Army **Guard**]
3	This law—signed by Rutherford Hayes—applies to members of the Army and Air Force except the National Guard, forbidding them from being involved in domestic law enforcement.	**Posse Comitatus** [PAH-say koh-mih-TAH-tuss] Act

Question #12: Social Studies

10 points per part

	Identify these types of U.S. courts:	
1	This type of court, first established in the 1980s, addresses cases in which people cannot pay their debts. These courts can rule on Chapter 7 liquidations and Chapter 11 reorganizations.	**bankruptcy** courts
2	These courts, which often hear cases just before they are taken up by the Supreme Court, used to be called circuit courts. The districts they oversee are still called circuits.	courts of **appeals** or **appellate** courts
3	This secretive court established in 1978 oversees warrant requests against suspected spies.	**Foreign Intelligence Surveillance** Court or **FISC** or **FISA** Court

Question #13: Science

10 points per part

	The most prominent section of this diagram is a downward-sloping diagonal region called the main sequence.	
1	Name this scatter plot of stars' temperature and magnitude.	**Hertzsprung-Russell** diagram [accept **H-R** diagram]
2	The hottest stars, on the left of a typical H-R diagram, are designated by this letter.	**O**
3	Ejnar ["EYE"-nar] Hertzsprung confirmed Henrietta Swan Leavitt's work on the relationship between the absolute magnitude and period of these stars, improving measurements of distances between galaxies.	**Cepheid** [SEFF-ee-id] variables or **Cepheid** variable stars [prompt on **variable**s or **variable** stars]

Question #14: Science

10 points per part

	Einstein predicted that orbiting bodies followed this type of path in space.	
1	Give this term for the shortest distance between two points. On Earth, this kind of path is an arc of a great circle.	**geodesic**s [jee-oh-DEZ-ik(s)]
2	The theory of general relativity got a significant boost when it was found that it accurately modeled and explained the precession of this planet.	**Mercury**
3	The clocks used in this commonly used navigation system maintained by the U.S. Air Force must be corrected by 38 microseconds per day due to relativistic effects.	**Global Positioning System** or **GPS**

Question #15: Literature

10 points

The first verse of this poem rhymes "a-flying" and "dying", and the second verse rhymes "a-getting" and "setting". This work is the most-quoted poem from the collection *Hesperides* [hess-"PAIR"-ih-deez], which also includes "Corinna's Going a-Maying". This poem calls the Sun "The glorious lamp of heaven". This poem states that "Worst times still succeed the former" after stating "That age is best which is the first." This poem advises women to "be not coy, but use your time, and, while ye may, go marry". Its first line is "Gather ye rosebuds while ye may." Name this 17th-century poem by the Cavalier poet Robert Herrick.	"**To the Virgins, to Make Much of Time**"

Question #16: Miscellaneous

10 points

Some lines of this crop are nicknamed "ren" for their resistance to *Erysiphe necator* [air-ih-SIF-ee neh-KAY-tor] fungi. The study of this crop, called viticulture, often focuses on the species *Vitis vinifera* [VIT-iss vin-IF-ur-uh]. One variety of this crop is "sultana", which in the United States is often called Thompson seedless. This food is often classified into the white-green type, the red type, and the blue-black type. Name this vine crop that has a Concord variety and is often used to make jelly or wine.	**grape**s [accept **grape**vines; prompt on **wine** or **vine**s]

Question #17: Science

10 points

A prediction of which of these hydrocarbons is produced by an elimination reaction is made by Zaitsev's rule. This series of hydrocarbons is produced by deep catalytic [kat-uh-LIH-tik] cracking. These compounds are hydrated ["hide-rate-id"] to produce alcohols. The simplest hydrocarbon in this series causes the death of parts of plants, but due to other effects is known as the ripening hormone. These hydrocarbons have twice as many hydrogen atoms as carbon atoms, and they are sometimes called olefins [OH-luh-finz]. Name these compounds that contain a carbon-carbon double bond, the two simplest of which are propene and ethene [ETH-een].	**alkene**s [AL-keenz, and the second vowel must be correct] [accept **olefin**s before "olefins"]

Question #18: Social Studies

10 points

In the closest thing to a fair election allowed by this president, his closest challenger was Ayman Nour of the Tomorrow Party, who got 7% of the vote. Before that election, this person was opposed by the Kefaya Movement, and afterwards he falsely claimed he was "President for Life". During protests, this person appointed Vice President Omar Suleiman, who announced this person's resignation and handed power to a military council. Name this president of Egypt who succeeded Anwar Sadat and resigned in 2011 during protests in Tahrir Square that were part of the Arab Spring.	(Muhammad) Hosni (El Sayed) **Mubarak** [HAHZ-nee moo-BAH-rahk] [or Muhammad Husni Sayyid **Mubarak**]

Question #19: Literature

10 points

In one novel by this author, the protagonist finds two men on an island while looking for her daughter, but cannot convince the title author to write her stories. In another novel by this author, a period of martial law leads a man to build a farm at his birthplace of Prince Albert. This author wrote about Susan Barton in *Foe* and wrote a novel in which an affair with Melanie Isaacs causes David Lurie to lose his professorship. This author won a Booker Prize for a novel about a hare-lipped gardener. Name this South African-born author of *The Life and Times of Michael K* and *Disgrace*.	J(ohn) M(axwell) **Coetzee** [kut-SEE]

Question #20: Science

10 points

These features are usually filled through the vadose [VAY-"dose"] zone. These features may be called "perched" if they sit above a low-permeability barrier. Storativity ["store"-uh-TIV-ih-tee] is a measurement of the properties of these features and may be calculated using a slug test. These areas may suffer from saltwater intrusion, especially if they are overpumped. Saturated areas of these features lie under the water table and can be accessed by drilling wells. Name these underground areas of stored water, one of which under the Great Plains is called the Ogallala [oh-guh-LAH-luh].	**aquifer**s

Question #21: Mathematics

10 points per part

	This operation on the natural numbers gives a set with the same size as the real numbers.	
1	Give this term for a set consisting of all subsets of a given set, including the empty set and the original set itself.	**power** set
2	How many sets are in the power set if the original set has three elements?	**eight** sets
3	If a set has ten elements, how many of the sets in its power set have exactly two elements?	**45** of the sets

Question #22: Mathematics

10 points per part

	This property of a conic section equals the ratio of the distance to the focus, divided by the distance to the directrix ["direct"-riks], at any point on the curve.	
1	Name this value that is less than 1 for ellipses and greater than 1 for hyperbolas.	**eccentricity**
2	Find the eccentricity of the ellipse generated by the equation [read slowly] x squared over 144 plus y squared over 169 equals 1.	**5/13**
3	Find the eccentricity of the shape generated by the equation [read slowly] x equals y squared plus $3y$ plus 7.	**1**

Question #23: Fine Arts

10 points per part

This musical tells the story of Huey Calhoun, a DJ who plays records by black singers on the radio.	
1	Identify this musical named for the city it takes place in. It won the Tony Award for Best Musical in 2010.	*__Memphis__*
2	*Memphis* won the Best Musical Tony over this other show set in Memphis. This musical is about a recording session featuring Johnny Cash, Jerry Lee Lewis, Carl Perkins, and Elvis Presley.	*__Million Dollar Quartet__*
3	The writer of the book for *Memphis*, Joe DiPietro, also created the musical *Nice Work If You Can Get It*, whose score is by these sibling songwriters.	George and Ira **Gershwin** [either order; accept the **Gershwin**s]

Question #24: Fine Arts

10 points per part

Answer the following about musicals that won the Pulitzer Prize for Drama.	
1	The 1960 Pulitzer-winning musical *Fiorello!* is about the politics of this U.S. city. The title character is this city's former Mayor Fiorello LaGuardia.	**New York** City [accept **NYC**]
2	*Sunday in the Park with George* earned a 1985 Pulitzer for this composer and lyricist. He also wrote *Sweeney Todd*.	Stephen (Joshua) **Sondheim**
3	This 2010 musical won the Pulitzer despite not being on the shortlist submitted to judges. This musical includes the songs "You Don't Know" and "I Am the One" and is about a woman with bipolar disorder.	*__Next to Normal__*

Question #25: Science

10 points per part

	Kary Mullis developed this technique in 1983.	
1	Name this method used to make many copies of a segment of DNA.	**polymerase chain reaction** or **PCR**
2	In this early step of PCR, DNA is heated so that it loses much of its structure.	**denaturation** or **denaturing** or **denature** [prompt on DNA **melt**ing]
3	PCR was improved by using this enzyme taken from bacteria in hot springs.	**Taq** ["tack"] DNA polymerase

Question #26: Science

10 points per part

	These molecules have a chain of carbon rings that includes three rings with six carbons each and one ring with five carbons.	
1	Name these compounds. The anabolic [an-uh-BAH-lik] type includes testosterone and is sometimes used illegally as a performance-enhancing drug.	**steroid**s
2	Some steroids are named for ecdysis [ek-"DIE"-siss] in invertebrates, which is also known as this process.	**molt**ing [prompt on **slough**ing or **shed**ding]
3	Cholic [KOH-lik] acid is in the class of steroid acids named for this substance that they work with in the body.	**bile** acids

Question #27: Social Studies

10 points per part

This leader defeated Ibrahim Lodi [EE-brah-heem LOH-dee] at the First Battle of Panipat [PAH-nee-paht].		
1	Name this grandfather of Akbar who established the Mughal [MOO-gul] Empire during the 16th century.	**Babur** [BAH-bur] [or **Zahir** ud-din Muhammad Jalal ud-din Babur]
2	Babur died in this city about 100 years before the Taj Mahal was built there.	**Agra**, Uttar Pradesh, India
3	A year after his victory at Panipat, Babur renounced the consumption of wine while rallying his troops to win this battle over Rana Sanga.	Battle of **Khanwa**

Question #28: Social Studies

10 points per part

There is some historical debate about whether this queen had lesbian relationships with Sarah Jennings Churchill or Abigail Hill.		
1	Name this early-18th-century English queen whose children all died young, which led to her being succeeded by her cousin George I.	Queen **Anne**
2	Anne was the last monarch from this royal house, in which she was preceded by James I, Charles I, Charles II, and James II.	House of **Stuart** or **Stuart** dynasty
3	After Anne died, this name was given to the effort to crown her Roman Catholic half-brother James the Old Pretender. The same name was given to other attempts to support Roman Catholic Stuarts.	**Jacobite** risings or **Jacobite** rebellions [prompt on **War of the British Succession**]

Question #29: Literature

10 points

This character asks "How can you hate Hitler so bad and be so ugly about folks right at home?". This character is taken aback by the amount of molasses that Walter Cunningham uses while eating lunch at her house. This girl is told that her friend had escaped being chained up by his father to explain why he left Meridian, Mississippi. This friend of Dill Harris is taught to read and write by Calpurnia [kal-PUR-nee-uh]. This resident of Maycomb, Alabama watches her father defend Tom Robinson on trial. Name this younger sister of Jem and daughter of Atticus in Harper Lee's *To Kill a Mockingbird.*	(**Jean-Louise**) **Scout** Finch [accept either underlined portion; prompt on **Jean** or **Louise** or **Finch**]

Question #30: Science

10 points

The potential energy field named for this person varies inversely with distance from a central point, and has a similar mathematical structure to a "barrier" named for this person that must be overcome for nuclear fusion. The constant named for this person equals one divided by the quantity 4 pi times the permittivity [pur-mih-TIV-ih-tee] of free space and is used in the inverse-square law named for him, which describes the force between two electric charges. Identify this French physicist whose namesake unit measures electric charge.	Charles-Augustin de **Coulomb** [sharl oh-goo-stan deh koo-lawm]

Question #31: Social Studies

10 points

The Supreme Court case *Witherspoon v. Illinois* addressed jurors' opinions on this action. The application of this action to Gary Gilmore was the subject of a Norman Mailer book. This action was temporarily banned by *Furman v. Georgia* in 1972 and re-allowed after *Gregg v. Georgia* in 1976, and arguments about it have focused on the 8th and 14th Amendments. Illinois Governor George Ryan put a moratorium the use of this action, and Pat Quinn abolished it in Illinois. Name this event that in recent times has usually been carried out by injection or electrocution.	**death penalty** or **capital punishment** [accept **execution** or any reasonable description of **put**ting criminals **to death**; prompt on **firing squad** before "8th and 14th Amendments"]

Question #32: Mathematics

10 points

This quality is measured using Diehard tests, some of which are based on the infinite monkey theorem. Stochastic [stoh-KASS-tik] variables have this quality. The one-time pad encryption technique is unbreakable if the key is secret, longer than the plaintext, and has this property. Diehard tests are necessary because many numbers appearing to have this quality do not actually have it and should be given the prefix "pseudo-". Name this quality often referring to numbers chosen so that all values in a range are equally likely.	**random**ness

Extra Question #1: Science

10 points

This organ is surrounded by muscle tissue called the *teniae coli* [TEN-ee-ee KOH-lee] and fat pouches called the epiploic [ep-ih-PLOH-ik] appendices. This organ is comprised of pouches called haustra [HAW-struh]. Blood from this organ goes to the inferior mesenteric [mez-en-TAIR-ik] vein. This organ is the most common location of the disease diverticulitis ["DIVER-tick-you-LIE"-tiss]. This organ begins with the cecum [SEE-kum], which is attached to the appendix. Much of this organ consists of the ascending, transverse, and descending colon. Name this organ that connects the small intestine to the anus.	**large intestine** [accept **large bowel**; prompt on **bowel**; accept **colon** before it is mentioned]

Extra Question #2: Social Studies

10 points

Many of the important documents taken during this event were later given to Pierre Dubrowsky. One of the people who benefited from this event was Auguste Tavernier [oh-goost tav-urn-yay], who had been part of the Damiens [dahm-yen] conspiracy. This event occurred just after a similar event at Hôtel des Invalides [oh-tel dez-ahn-vay-leed] in which many weapons were taken, and it helped the same people get gunpowder. This event occurred three days after the dismissal of Jacques Necker [zhahk neh-"care"] by King Louis XVI [16]. Eight guards died in this attack. Name this event that occurred on July 14, 1789 at the beginning of the French Revolution.	**storm**ing of the **Bastille** [accept any reasonable answer containing **Bastille** and the idea of an attack; accept **Bastille Day**; prompt on the **French Revolution**]

Extra Question #3: Fine Arts

10 points

One of this composer's earliest works was *Morceaux de fantaisie* [mor-soh deh fahn-tah-see] and contains a piece that is the basis of Dave Malloy's musical *Preludes*. That piece, which begins with three loud chords, is this composer's "Prelude in C-sharp minor". Shortly after leaving Russia, this composer was inspired by an Arnold Böcklin painting to write *Isle of the Dead*. This person drank a crème de menthe before performing the last part of one of his works, which is based on the last caprice by another composer. Name this pianist and composer who wrote *Rhapsody on a Theme of Paganini*.	Sergei **Rachmaninoff**

Extra Question #4: Mathematics

10 points

The name of this property is used to describe the reduction of a directed graph so that it has as few edges as possible without losing the possibility of travelling between two vertices. The relation "has a common factor greater than 1" is not an equivalence relation because it does not have this property. This is the only property of equivalence relations that requires three relationships to state, and it is also the only one that also applies to set inclusion and inequalities. Name this property stating that if x equals y and y equals z, then x equals z.	**transitive** property or **transitivity**

Extra Question #5: Literature

10 points

In Hindu mythology, one of these places named Chakravana is the location where Vishvakarma [VISH-vuh-"karma"] made Vishnu's weapon, which was called the Sudarshana Chakra [soo-dar-SHAH-nah CHAHK-rah]. One of these places was used to churn the ocean of milk and was called Mandara. In Norse mythology, these places were made from Ymir's [EE-mir'z] bones. Hesiod [HESS-ee-ud] claimed that he spoke with the muses at one of these places called Helicon [HEL-ih-kahn], though some sources place the muses at another one, Parnassus [par-NASS-us]. Name these locations, one of which is where the twelve most powerful Greek gods lived and is called Olympus.	**mountain**s [accept mountain **range**s after "Ymir's"]

Extra Question #6: Literature

10 points per part

	Sarah Orne Jewett invented the fishing village of Dunnet Landing in this state for her novel *The Country of the Pointed Firs.*	
1	Name this state. In Jewett's short story "A White Heron", Sylvia betrays a hunter looking for the heron in this state.	**Maine**
2	In this author's novel *The Cider House Rules*, an orphanage in Maine houses Homer Wells.	John (Winslow) **Irving** [or John Wallace **Blunt** Jr.]
3	This popular horror writer sets many of his novels in Maine, including *Carrie*, in which a telekenetic high schooler takes revenge on Chamberlain, Maine.	Stephen (Edwin) **King**

Extra Question #7: Literature

10 points per part

	Mark Twain wrote an essay claiming that this man "scored 114 offenses against literary art out of a possible 115".	
1	Name this author who included the novel *The Last of the Mohicans* in his series *The Leatherstocking Tales.*	James Fenimore **Cooper** [prompt on **Fenimore**]
2	Twain criticized this first novel of *The Leatherstocking Tales* for "accomplish[ing] nothing and arriv[ing] in air." In this novel, "Floating Tom" Hutter dies.	*The **Deerslayer**(, or The First War-path)*
3	Twain also critiqued Cooper for breaking "the eternal laws of Nature" because this companion of Natty Bumppo follows moccasin tracks along a streambed and the tracks aren't washed away.	**Chingachgook** [chene-GACH-gook]

Extra Question #8: Science

10 points per part

	This unit of magnetic field strength equals one weber per square meter.	
1	Identify this unit named for a Serbian-American scientist who was born in what is now Croatia.	**tesla**
2	Nikola Tesla helped George Westinghouse win the War of Currents, which is why this type of current is used for power-grid distribution rather than DC.	**alternating** current or **AC**
3	Tesla's work led to the development of the magnetic type of these devices which use direct currents to strengthen alternating currents. These devices are different than transformers because they can increase current and voltage simultaneously.	**amplifier**s

Extra Question #9: Science

10 points per part

	This phenomenon occurs when the driving frequency of a system matches its natural frequency.	
1	Name this phenomenon in which oscillation occurs at particularly large amplitudes.	**resonance** [or **resonating**]
2	Impure notes on musical instruments often have a fundamental resonant frequency and these other resonant frequencies that are greater than the fundamental frequency.	**overtone**s [prompt on **harmonic**s]
3	If a musical instrument made from a pipe with one open end and one closed end has a fundamental frequency of 100 hertz ["hurts"], what is the frequency of the first overtone?	**300** Hz