



VHSL Sample Packet  
Packet 1

First Period

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1. This river's tributaries include the Cumberland. In 1774, Quebec's *southern* boundary was set at this river, whose falls are near Louisville [LOO-ah-vill]. In Pittsburgh, the Monongahela [muh-nawn-gah-HAY-luh] and Allegheny [AL-uh-GAY-nee] Rivers join to form—for 10 points—what river that flows past Cincinnati in its namesake state?  
answer: **Ohio** River <389194>
2. In this opera, one character paints a picture of Mary Magdalene while singing "Recondita armonia" [ray-kohn-DEE-tuh ar-MOH-nee-uh], and is the lover of a character who sings "Vissi d'arte" [VEE-see DAR-tay]. For 10 points—the title singer stabs the Napoleonic police chief Baron Scarpia in what opera by Giacomo Puccini [JAH-koh-moh poo-CHEE-nee]?  
answer: **Tosca** [TAH-skuh] <383821>
3. In the 19th century, this island was circumnavigated by Matthew Flinders. Its southernmost part, Wilson's Promontory, juts into the Bass Strait; that peninsula is in the state of Victoria. The sandstone monolith Uluru [oo-LOO-roo] is in—for 10 points—what nation whose capital is Canberra [KAN-bruh]?  
answer: **Australia** (or Commonwealth of **Australia**) <357599>
4. This structure, which included several *ouvrages* [oov-rahj], ran parallel to the opposing Siegfried [SEEG-freed] forts and was named for a minister of war. A two-day push through Belgium and the Ardennes [ar-DEN] Forest in May 1940 allowed German forces to bypass it. For 10 points—name this heavily fortified French "line."  
answer: **Maginot Line** [mah-zhee-noh "line"] (or **Ligne Maginot**; accept **Maginot** by itself after "line") <388388>
5. Eleanor Roosevelt praised this athlete's HUAC testimony against Paul Robeson ["ROBE-uh-son"]. Branch Rickey signed this man to the Montreal Royals for the 1946 season before he was called up to the Brooklyn Dodgers. For 10 points—what man wore number 42 while breaking baseball's color barrier?  
answer: Jackie **Robinson** (or Jack Roosevelt **Robinson**) <329658>
6. Proteins sent to this organelle [OR-guh-nel] are tagged with mannose-6-phosphate [MAN-nohss "six" FAHSS-"fate"]. Tay-Sachs [tay-saks] disease is caused by a defect in this organelle, which maintains an internal pH ["P-H"] of about 4.5 to aid in hydrolysis ["hi"-DRAH-luh-siss]. For 10 points—name this acidic organelle whose main job is to break down molecules.  
answer: **lysosome**s [LYE-suh-zohm] <388592>
7. Edmund Phelps theorized that there is no long-run tradeoff between inflation and this other quantity. This quantity can be cyclical or frictional; the latter occurs when a person is searching for a new job. For 10 points—what "rate" measures the amount of jobless people seeking work?  
answer: **unemployment** (rate) <385880>

8. A scar on this man's thigh causes him to be recognized by his old servant Eurycleia [yoo-rih-KLEE-uh]. Near the end of an epic poem, he kills Antinous [ann-TIN-oh-us] and several other suitors of his wife with the help of his son Telemachus [tel-LEH-mah-kiss]. For 10 points—what king of Ithaca is the title hero of a Homeric epic?

answer: **Odysseus** (or **Ulysses**; do not accept or prompt on "(the) Odyssey")

&lt;387203&gt;

9. Hypercapnia ["hyper"-CAP-nee-uh] is an excess of this substance in the blood, which can lead to acidosis ["ASS"-ih-DOH-siss]. 3-Phosphoglycerate ["three" fahss-foh-GLIH-suh-"rate"] forms when Rubisco [roo-BISS-koh] binds this triatomic molecule. This gas is released when a can of soda is opened. For 10 points—name this molecule humans exhale whose molecular formula is CO<sub>2</sub> ["C-O two"].

answer: **carbon dioxide** (accept **CO<sub>2</sub>** before "CO<sub>2</sub>")

&lt;383616&gt;

10. This book imagines a "pile" of classic literature that is sufficient to "scale heaven" in a chapter titled "Reading." Its first chapter, "Economy," lists the cost of materials necessary to build a small house "in the woods" near the title pond. For 10 points—name this book by Henry David Thoreau [thoh-ROH].

answer: **Walden**(; or, Life in the Woods)

&lt;388594&gt;

11. Newton-Cotes quadrature rules approximate this operation and are exemplified by the trapezoid rule, which is more precise than using a Riemann [REE-mahn] sum. It can sometimes be evaluated using an antiderivative. For 10 points—name this calculus operation that finds the area under a curve.

answer: **integral** or **integration**

&lt;383510&gt;

12. It is possible to extract work from the ergosphere surrounding rotating examples of these objects. They include a central gravitational singularity that is surrounded by an event horizon. For 10 points—name these stellar remnants from which even light cannot escape.

answer: **black holes**

&lt;387907&gt;

13. This man's "New Life Movement" was an attempt to re-popularize the teachings of Confucius. After fleeing the 1949 siege of Chengdu [cheng-doo], this head of the Kuomintang [KWOH-min-TAHNG] established and led a new "republic" on Taiwan. For 10 points—name this anti-Communist Chinese leader who opposed Mao Zedong [zuh-DUNG].

answer: **Chiang Kai-shek** [J'YAHNG kye-SHEK] (or **Jiang Jieshi** or **Jiang Zhongzheng**)

&lt;387260&gt;

14. A double portrait by this man includes a glass bell jar at the foot of Antoine Lavoisier [lah-VWAH-zee-ay]. A man with a towel wrapped around his head, who has just been killed by Charlotte Corday [kor-DAY], is the subject of another of his paintings. For 10 points—name this French painter of *The Death of Marat*.

answer: Jacques-Louis **David** [ZHAK loo-EE dah-VEED]

&lt;386358&gt;

15. This physicist analyzed the nature of light by using a pair of prisms to split and recombine white light, an experiment that he described in his 1704 book *Opticks*. Every action has an equal and opposite reaction according to—for 10 points—what Englishman's third law of motion?

answer: Isaac **Newton** (accept **Newton's third law** of motion)

&lt;387209&gt;



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Directed Questions

1A. What Mexican general evaded capture by John J. Pershing's forces after his División del Norte [dee-vee-see-OHN del NOR-tay] raided Columbus, New Mexico in 1916?

answer: Pancho **Villa** [PAHN-choh VEE-yah] (or Francisco **Villa** or José Doroteo **Arango** Arámbula [dor-oh-TAY-oh ah-RAHN-goh ah-RAHM-boo-lah])

<390640>

1B. [20-second calculation question] Pencil and paper ready. Two answers required. For what *two* values of  $b$  does the equation  $x$  squared plus  $bx$  [“B-X”] plus 36 have a double root?

answer:  $b = 12$  and  $b = -12$  (accept answers in either order; accept  $b = \text{plus and minus } 12$ ; do not accept or prompt on partial answers) [A double root will exist if the discriminant is zero, so  $d = b^2 - 4ac = 0$ , so  $b^2 - (4 \times 1 \times 36) = 0$ , so  $b^2 - 144 = 0$ , so  $b^2 = 144$ , and  $b = \pm 12$ .]

<388068>

2A. Any object that is speeding up or slowing down or changing direction is experiencing what phenomenon, defined as the rate of change of velocity?

answer: **acceleration** (accept **accelerating**; prompt on “a”)

<387453>

2B. Der [DAIR], die [DEE], and das [DAHSS] are the masculine, feminine, and neuter forms of the definite article in what language?

answer: **German** language (or **Deutsch** [doytch])

<308417>

3A. The sociologist Robert Neil Butler coined what six-letter term that refers to acts of discrimination that show prejudice against the elderly?

answer: **ageism** [“age-is”-um] (accept **ageist**)

<391157>

3B. Zeno of Citium [ZEE-noh of SIT-ee-um] founded what ancient school of philosophy that believed in determinism and whose members included Seneca?

answer: **Stoicism** (or the **Stoics**)

<384358>

4A. [30-second calculation question] Pencil and paper ready. What are the coordinates of the *center* of the circle defined by the equation  $x$  squared plus  $y$  squared plus  $2y$  equals 18?

answer: **(0, -1)** [“zero comma negative one”] (or  **$x = 0$  and  $y = -1$**  or  **$y = -1$  and  $x = 0$** ; do not accept or prompt on partial answers) [ $x^2 + y^2 + 2y = 18$ , so  $x^2 + y^2 + 2y + 1 = 18 + 1$ , so  $(x + 0)^2 + (y + 1)^2 = 19$ ; this is in center-radius form, so the coordinates of the center are (0, -1).]

<441073>

4B. What item, whose “five-cent” version was desired by Vice President Thomas Marshall, was the major consumer product of the 19th-century tobacco industry?

answer: **cigars** (accept five-cent **cigar**; do not accept or prompt on “cigarette”)

<385452>

5A. Mammalian lungs have what specialized air sacs where the exchange of gases takes place?

answer: **alveoli** [al-VEE-uh-lye] OR **alveolus**

<234085>

5B. The Danube flows through Belgrade [“BELL-grade”], Bratislava [BRAH-tih-SLAH-vah], Budapest [BOO-duh-pesht], and what other European capital, site of the Hofburg and Schönbrunn [SHURN-broon] palaces?

answer: **Vienna** (or **Wien**)

<315162>

6A. Since 2009 Ted Allen has hosted what Food Network show, in which contestants prepare an appetizer, entrée [AHN-tray], and dessert using baskets of ingredients?

answer: **Chopped**

&lt;391150&gt;

6B. What author created the sailor Charles Marlow, a recurring character who narrates his novels *Lord Jim* and *Heart of Darkness*?

answer: Joseph **Conrad** (or Józef Teodor Konrad **Korzeniowski**)

&lt;364785&gt;

7A. [20-second calculation question] Pencil and paper ready. How many total handshakes will occur at a 20-person party if each person shakes hands with every other person exactly once?

answer: **190** handshakes [Each of the 20 persons will shake hands with 19 other people, so  $20 \times 19 = 380$ , but this double-counts every handshake, so the actual total is  $380/2 = 190$ .]

&lt;388163&gt;

7B. The world's largest lizard is what Indonesian lizard with a venomous bite?

answer: **komodo** dragon or **Varanus komodoensis**

&lt;232184&gt;

8A. George Whitefield and Jonathan Edwards were influential preachers during what mid-18th century period of religious revival in the American colonies?

answer: First **Great Awakening**

&lt;390850&gt;

8B. What Founding Father noted that "three may keep a secret, if two of them are dead," in the 1735 edition of *Poor Richard's Almanack*?

answer: Benjamin **Franklin**

&lt;390614&gt;

9A. Between 1900 and 1904 Pablo Picasso went through what period, named for a color, that resulted in *Portrait of Suzanne Bloch* and *The Old Guitarist*?

answer: **Blue** Period

&lt;219117&gt;

9B. [30-second calculation question] Pencil and paper ready. What is the definite integral, from  $x$  equals 1 to  $x$  equals 4, of  $x$  squared  $dx$  ["D-X"]?

answer: **21** [Using the power rule,  $\text{Int}(x^2) = x^3/3$ , so, from  $x = 1$  to  $x = 4$ ,  $(4^3/3) - (1^3/3) = (64 - 1)/3 = 63/3 = 21$ .]

&lt;440895&gt;

10A. What measure of concentration is equal to the moles of solute divided by the *mass* of solvent, in kilograms?

answer: **molality** [moh-LAL-ih-tee] or **molal** [moh-lal] (do not accept or prompt on "molarity")

&lt;393768&gt;

10B. What man, who currently resides in the Mater Ecclesiae [MAH-tair ay-KLEE-zee-ay] monastery, added the word "emeritus" to his title following his 2013 resignation?

answer: Pope **Benedict XVI** ["the 16th"] (or Joseph (Aloisius) **Ratzinger**; prompt on "Benedict" or "(the) pope emeritus"; do not accept or prompt on "(the) pope")

&lt;391331&gt;



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Third Period

16. In French, this type of punctuation is often replaced with *guillemets* [geel-MAY]. In English, the title of a conference, photograph, newspaper article, short story, or single song is indicated using these paired symbols. For 10 points—name these punctuation marks also used to enclose speech.

answer: **quotation marks** (or **quote marks**)

<392849>

17. This English king lost his territories on the European continent after Otto IV ["the fourth"] lost to France at the Battle of Bouvines [boo-VEEN]. This successor to Richard the Lionheart was forced to grant additional power to his barons in 1215. For 10 points—name this king who signed the Magna Carta.

answer: King **John** of England (accept **John Plantagenet** or **John Softsword** or **John Lackland**)

<372283>

18. Friedrich Bergius won a Nobel prize for developing a method to hydrogenate this substance for liquefaction. By compactifying peat, the low-grade lignite [LIG-"night"] form of this rock is produced. Anthracite [ANN-thruh-"sight"] and "bituminous" [bih-TOO-mih-nuss] are forms of—for 10 points—what most commonly burned fossil fuel?

answer: **coal** (accept bituminous **coal** before "lignite")

<385944>

19. This character cries, "Howl, howl, howl, howl!" after learning that the queen of France has been hanged. He states, "Nothing will come of nothing" when his youngest daughter refuses to flatter him. Cordelia is disinherited by—for 10 points—what title monarch of a tragedy by Shakespeare?

answer: King **Lear** (accept The **Tragedy of King Lear**)

<389117>

20. During the Civil War, this state was the site of the Tullahoma Campaign. Fort Henry and Fort Donelson were located in this state, which was governed until 1865 by Andrew Johnson. Battles at Chattanooga and Shiloh were fought in—for 10 points—what state whose capital is Nashville?

answer: **Tennessee** (accept Middle **Tennessee** Campaign)

<384169>

21. In 2014 this company introduced a new interactive product called Sprout. The current CEO of this company lost to Jerry Brown in the 2010 California gubernatorial election. Meg Whitman currently leads—for 10 points—what technology company whose name is often abbreviated to two letters?

answer: **Hewlett-Packard** (Company) (or **HP**)

<386852>

22. The structure of this entity was incorrectly described by the Davson-Danielli model, which has been supplanted by the fluid mosaic model. It surrounds the cytoplasm ["SIGH"-toh-plazm] and in plants is itself surrounded by a cell wall. For 10 points—name this structure separating a cell from the outside.

answer: cell **membrane** (or **plasma membrane** or **plasmalemma**)

<383738>

23. This character thinks about his own reluctance to hit people while imagining a confrontation with a glove thief. He buys a record called *Little Shirley Beans* for his younger sister, Phoebe [FEE-bee]. "Phonies" are hated by—for 10 points—what narrator of J. D. Salinger's [SAL-in-jur'z] book *The Catcher in the Rye*?

answer: **Holden Caulfield** (accept either underlined portion)

<427848>

24. This musical's protagonists note "there's a strange exhilaration / in such total detestation" in the song "What is This Feeling?" Madame Morrible [MOR-ih-bul] is arrested at the end of this musical, after the Grimmerie [GRIM-ur-ee] is given to Glinda. For 10 points—name this musical about the green-skinned Elphaba [EL-fuh-buh].

answer: **Wicked**

<387819>

25. Examples of these substances include boron trifluoride ["try-FLOW-ride"], whose empty orbital can act as an electron pair acceptor. They create hydronium [hye-DROH-nee-um] ions according to Svante Arrhenius [SVAHN-tay uh-REE-nee-uss]. They turn litmus paper red. For 10 points—name these sour substances that usually have pH less than 7.

answer: **acids** (accept **acidic**; accept **Lewis acids** before "hydronium")

&lt;383634&gt;

26. This author described a wart that appeared on the face of the sphinx in his comic travelogue *The Innocents Abroad*. A character created by this author becomes trapped in McDougal's Cave with the judge's daughter, Becky Thatcher. For 10 points—name this author who created Tom Sawyer.

answer: Mark **Twain** (or Samuel Langhorne **Clemens**)

&lt;387051&gt;

27. As minister to France, this man decried Jay's Treaty for being anti-French. As president, he signed the Missouri Compromise, and his tenure was known as the "Era of Good Feelings." A "doctrine" warning Europe not to meddle in the Americas was espoused by—for 10 points—what fifth president?

answer: James **Monroe** (accept **Monroe Doctrine** after "policy")

&lt;387818&gt;

28. In 1990, a "stateful" type of these programs was developed, which examined many packets to decide if they are safe. "Pinholes" may be "punched through" these programs to let services bypass them. Network traffic is examined by—for 10 points—what programs that protect computers from intrusions?

answer: **firewalls**

&lt;385622&gt;

29. A sermon in this book of the Bible describes an altar "to an unknown god." Stephen is stoned and Peter raises Tabitha from the dead in this book, which may have been written by Luke. The conversion of Paul occurs in—for 10 points—what New Testament book following the four Gospels?

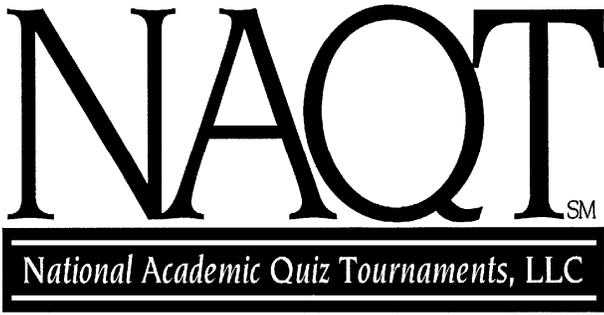
answer: **Acts** of the Apostles (or Book of **Acts** or **Praxeis** ton Apostolon or **Actus** Apostolorum)

&lt;362698&gt;

30. These institutions were the topic of Franklin D. Roosevelt's first Fireside Chat. Taxing one of them sparked the Supreme Court case *McCulloch v. Maryland*; that national one was led by Nicholas Biddle. For 10 points—what financial institutions have deposits insured by the FDIC?

answer: **banks** (accept **banking** industry; accept Second **Bank of the United States** or Second **National Bank** after "Taxing"; prompt on "financial (institutions)" before "financial"; do not accept or prompt on "credit union(s)")

&lt;387866&gt;



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Additional Questions

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Replacement/Tiebreaker Tossups

31. This number is the variance of the standard normal distribution. The probability of the *complement* of an event is found by subtracting the event's probability from this integer. For 10 points—give this number, the largest possible probability, which indicates an event *will* occur.

answer: **1** (accept **100 percent**; do not accept or prompt on "100")

<383579>

32. A novel in this language depicts the swearing of the Peach Garden Oath, which occurs before the Battle of Red Cliffs. The 14th-century "Great Classical Novel" *Romance of the Three Kingdoms* depicts a dynasty's collapse in—for 10 points—what Asian language spoken by the author Luo Guanzhong [loh gwahn-jong]?

answer: **Chinese** (or **Zhongwen** or **Hànyu** or **Zhongguohua**; accept specific forms of Chinese such as **Mandarin Chinese**, **Cantonese Chinese**, **Classical Chinese**, or **vernacular Chinese**)

<387297>

33. This man reused his "Sanctus" [SAHNK-toooss] in D major for six voices in his Mass in B minor. The oldest known harpsichord ["HARP"-suh-"cord"] solo appears in the fifth of a set of six works he composed for a margrave. The *Brandenburg Concertos* were written by—for 10 points—what German Baroque composer?

answer: Johann Sebastian **Bach**

<387034>

Replacement/Tiebreaker Directed Questions

21. [20-second calculation question] Pencil and paper ready. If the base 8 logarithm of  $x$  equals 10, what is the base 2 logarithm of  $x$ ?

answer: **30** [ $\log_8 x = 10$ , so  $x = 8^{10} = (2^3)^{10} = 2^{30}$ , and thus  $\log_2 x = 30$ .]

<390897>

22. What poet imagined a deadly apple produced by anger in "A Poison Tree," which was one of his *Songs of Experience*?

answer: William **Blake**

<390819>