

2023 Academic Super Bowl
Senior English
Study Guide
The Age of Exploration



- I. Drama - 40%
- A. *The Tempest* by William Shakespeare, Folger Shakespeare Library
ISBN 9 78073 482837
- II. Novel - 40%
- A. *Caleb's Crossing* by Geraldine Brooks
ISBN 978-0-14-312107-7
- III. Poetry - 20%
- A. "Eagle Poem" by Joy Harjo
<https://www.poetryfoundation.org/poems/46545/eagle-poem>
- B. "Ozymandias" by Percy Bysshe Shelley
<https://www.poetryfoundation.org/poems/46565/ozymandias>
- C. "The Author to Her Book" by Anne Bradstreet
<https://poets.org/poem/author-her-book>
- D. "You Laughed and Laughed and Laughed" by Gabriel Jibaba Okara
<https://theafricanbookreview.com/2014/05/09/you-laughed-and-laughed-and-laughed-gabriel-okara/>

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2023 Academic Super Bowl
Senior Fine Arts
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- I. Music - 50%
- A. Basics of Music (50% of music questions)
1. *cantus firmus*
 2. counterpoint (general term and species)
 3. motet
 4. madrigal
 5. mass/Renaissance mass
 6. musical textures (monophony, homophony, polyphony)
 7. vihuela
 8. villancico
- B. Music of Iberia (50% of music questions)
1. Leonora Duarte
 2. Luis de Milán
 3. Cristóbal de Morales
 4. Tomás Luis de Victoria
- II. Visual - 50%
- A. Artists
1. El Greco
 2. Pedro Berruguete
 3. Alonso Sanchez Coello
 4. Diego de Velazquez
 5. Francisco de Zurbaran
 6. Jusepe de Ribera

Sources: Music - *Wikipedia*

All music for the competitions comes from YouTube, except for that of Leonora Duarte, which comes from *Wikipedia*.

Spanish Painting: 1200-1665 by Emma Hansen

Visual Art: *Spanish Painting 1200-1665* by Emma Hansen (although the question writer used this book, it is not required to purchase for this contest as images may be researched on the web)

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Senior Math

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- I. Algebra - 28%
 - A. Rational Functions
 - 1. Simplifying and Basic Operations (+, -, x, /)
 - 2. Asymptotes (slant, vertical, and horizontal)
 - B. Solving Rational Equations and Inequalities

- II. Logic and Set Theory - 20%
 - A. Logic
 - 1. Basic definitions: propositions, conditional statements, tautologies, identities, negation
 - 2. Compound statements, converse, contrapositive, conjunction, disjunction, and truth tables
 - B. Set Theory
 - 1. Set properties and definitions
 - 2. Intersection, union, subset, complement
 - 3. Venn diagrams

- III. Geometry - 20%
 - A. Volumes
 - 1. Right solids - prism, pyramid, cylinder, cone
 - 2. Frustums of pyramids and cones
 - 3. Spheres

- IV. Spherical Trigonometry - 16%
 - A. The spherical triangle - angles and sides
 - B. Parts of a right spherical triangle - Napier's circle
 - C. Parts of obtuse triangles, including the ambiguous cases
 - D. Spherical excess and area

- V. Enrichment Topics - 16%
 - A. Navigation
 - 1. Latitude and longitude on a sphere
 - a. find positions, distances, and angles
 - 2. History of the "Longitude Problem"
 - a. Contributions of John Harrison
 - B. Gerardus Mercator and the Mercator projection
 - 1. The Mercator 1569 World Map

RESOURCE:

Longitude: The True Story of a Lone Genius Who Solved the Greatest Scientific Problem of His Time by Dava Sobel, 1995, Bloomsbury Publishing Plc.
ISBN-13 9780802715296

2023 Academic Super Bowl
Senior Science
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- I. Chemistry - 33%
- A. Properties of Metals - know definitions of terms and graph meanings
 - 1. General properties and locations on Periodic Table
 - a. Elasticity
 - b. Stress
 - c. Strain
 - d. Modulus
 - e. Ductility
 - f. Malleability
 - g. $F = YA\Delta L/L_0$
 - 2. Identify Regions of typical stress/strain curve
 - B. Alloys - Steel, Bronze, Brass
 - 1. Composition
 - 2. Properties
 - 3. How prepared
 - C. Oxidation and Reduction = REDOX
- II. Biology and Environmental Science - 33%
- A. Organizing Life on Earth - The Development of Classification Systems and Systematics
 - 1. Pre-Linnaean
 - 2. Explorations (late 1400s through the 1800s- New Worlds and New Life)
 - 3. Linnaean (1700s - development of relationships by systematically observed similarities)
 - 4. Modern Taxonomy and Phylogenetics
 - a. Looking at relationships between organisms; includes consideration of evolutionary models
 - b. Representing Relationships through display of data in graphical forms
 - 1. Branches, Trees, Shrubs
 - 2. Cladograms and Phylogenetic Diagrams (often called Trees)
 - B. Notable Individuals Associated with the Development of Systematics
 - 1. Basic Biography and Major Works and/or Contributions
 - a. Aristotle (384 BCE - 322 BCE)
 - b. Pliny the Elder (23 - 79 CE)
 - c. Conrad Gessner (1516-1565) also commonly found as "Konrad Gesner"
 - d. Maria Sibylla Merian (1647 - 1717)
 - e. Carolus Linnaeus (1707 - 1778) aka Carl von Linne
 - f. Willi Hennig (1913 - 1976)
- III. Physics - 33% (see 2nd page)

Physics

A. Instruments (25% of total of Physics portion)

<https://www.nps.gov/fora/learn/education/navigation-and-related-instruments-in-16th-century-england.htm>

1. Quadrant
<https://exploration.marinersmuseum.org/object/quadrant/>
2. Astrolabe
<https://exploration.marinersmuseum.org/object/astrolabe/>
3. Cross Staff
<https://exploration.marinersmuseum.org/object/cross-staff/>
4. Compass
<https://exploration.marinersmuseum.org/object/compass/>
5. Hourglass - best description in overview link at top of page
6. Chip log
<https://www.brighthubengineering.com/seafaring/60582-what-is-a-chip-log/>
<https://www.youtube.com/watch?v=OmRtfq50meg>

B. Applied Problems (75% of total of Physics portion)

1. Latitude determination – Celestial Navigation
 - a) Noon day Sun
<https://astronavigationdemystified.com/latitude-from-the-midday-sun/>
 - b) Polaris
<https://astronavigationdemystified.com/latitude-from-polaris/>
 - c) Other stars
<https://archive.hokulea.com/navigate/latitude.html>
2. Velocity related problems - see any introductory physics textbook
 - a. resolve speed and heading into direction components
 - b. relative velocity problems: including ocean currents

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Senior Social Studies

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The Age of Exploration: The Columbia Exchange



- I. Creating the Homogenocene - 25%
 - A. Christopher Columbus
 - B. Explorers, Conquerors, Kings, Priests, and Entrepreneurs
 - C. American Silver and Early Globalization
 - D. The Columbian Exchange
 - E. Recreating Pangaea

- II. The Exchange of Animals - 5%
 - A. Domesticated Animals
 - B. Insects, Worms, and Others

- III. The Exchange of Plants - 25%

A. Maize	F. Tobacco
B. Potatoes	G. Wheat
C. Rubber Trees	H. American Foods and Famine
D. Sugar Cane	I. Guano as Fertilizer
E. Sweet Potatoes	J. Modern Agriculture

- IV. The Exchange and Mixture of Peoples - 25%
 - A. Indians
 - B. Europeans
 - C. Africans
 - D. Asians
 - E. American Demographics

- V. Exchange of Pathogens - 10%
 - A. Human Diseases
 - B. Plant Parasites and Blights

- VI. Costs and Benefits of the Columbian Exchange
 - A. to American Indians
 - B. to Europeans
 - C. to Africans
 - D. to East and Southeast Asians

Source: 1493: Uncovering the New World Columbus Created by Charles C. Mann
First published by Alfred A. Knopf, 2011; Paperback published by Vintage Books, 2012
Vintage ISBN: 978-0-307-27824-1

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