

**2016-17 Pentathlon Science Resource Guide Outline**  
***The Atom and the Nucleus***

Section I. The Atom.....(33%)

- A. Early Models of the Atom
- B. The Bohr Model
- C. Modern Atomic Model

Section II. The Atomic Nucleus .....(33%)

- A. Structure of the Nucleus
- B. Radioactivity
- C. Mathematics and Detection of Radioactive Decay
- D. Sources and Effects of Radiation
- E. Applications of Radioactivity

Section III. Nuclear Reactions.....(33%)

- A. Energy
- B. Nuclear Fission
- C. Nuclear Fusion

**2016-17 Pentathlon Literature Resource Guide Outline**  
***Number the Stars* and Selected Work of World War II**

Section I. Critical Reading.....	28%
Section II. Theme: World War II.....	11%
A. Historical Context	
B. Theaters of War	
C. Women and War	
D. World War II and Literature	
Section III. Novel: <i>Number the Stars</i> .....	32%
A. Lois Lowry - Biography	
B. Plot Synopsis/Analysis	
C. Characters	
D. Literary Devices	
E. Themes	
Section IV. Shorter Selections: Prose.....	11%
A. Diary Entries from Jewish people during the war	
B. "Survivor Leesha Rose on Inquiring about an Illegal Resistance Movement" Leesha Rose	
C. "Eva Heyman on the Deporting of her friend, Marta, from Hungary" Eva Heyman	
D. "Thoughts on Peace in an Air Raid" Virginia Woolf	
Section V. Shorter Selections: Poetry.....	17%
A. "I Never Saw Another Butterfly" Pavel Friedman	
B. "Fear" Eva Picková	
C. "Desert Flowers" Keith Douglas	
D. "Vergissmeinnicht" Keith Douglass	
E. "War Poet" Donald Bain	

**Fine Arts**  
***Art and Music of the World War II Era***

Section I. Art Fundamentals.....	16%
A. Art History	
B. Elements of Art	
C. Processes and Techniques	
Section II. Basic Elements of Music Theory.....	19%
A. Sound and Music	
B. Rhythm	
C. Other Aspects of Musical Sound	
Section III. Pre-War Music.....	17%
A. In the Great War's Aftermath	
B. Listening Examples	
Section IV. The Art of World War II.....	18%
A. Art as World War II Propaganda	
B. European Art of the World War II Era	
C. Selected Works of Art	
Section V. The Music of World War II.....	13%
A. Music in Wartime America	
B. Music in the Ranks	
C. Listening Examples	
Section VI. Post-World War II Art.....	17%
A. American Abstract Expressionism	
B. Post-War European Art	
C. World War II Memorialized in Art	
D. Selected Works of Art	

**2016-17 Pentathlon Social Science Resource Guide Outline**  
***World War II***

Section I: Roots & Causes of World War II.....21%

- A. Treaty of Versailles
- B. Totalitarianism in Europe
- C. Rise of Dictators: Eurasia
- D. Hitler & Nazi Germany

Section II: War in Europe.....32%

- A. The Invasion of Poland
- B. American Neutrality in 1939
- C. The Attack on France
- D. The Battle of Britain
- E. Operation Barbarossa
- F. Changing Attitudes in America
- G. The Holocaust: Roots
- H. "Final Solution"
- I. The End of Holocaust
- J. The Battle of Stalingrad
- K. The Battle of the Atlantic
- L. German Retreat in the East
- M. 1944: The War in Italy
- N. The Second Front in France
- O. The Drive on Germany, 1944
- P. The Yalta Conference: 1945
- Q. Allied Advance in the West
- R. Soviet Advances in the East

Section III: The Asia-Pacific War, 1937-41.....29%

- A. 1940
- B. Pearl Harbor
- C. Offensive in the Far East
- D. The Fall of Singapore, 1942
- E. The Loss of the Philippines, 1942
- F. Internment of Japanese Americans
- G. The War in the Pacific: The Allies Checks the Axis
- H. The Potsdam Conference: 1945
- I. The Endgame

**Section IV: The Aftermath and Consequences of World War II.....18%**

- A. The Post-War Trials at Nuremberg & Tokyo**
- B. The Roots of the Cold War in Asia & Europe**
- C. The Atomic Age: Living with the Bomb**
- D. Duck and Cover**
- E. Hydrogen Bomb**
- F. Decolonization in Asia**
- G. India**
- H. Indo-China**

# MATHEMATICS

## *Algebra and An Introduction to Trigonometry*

### I. ALGEBRA

60%

#### A. Solving Equations

1. Solving Equations Using Subtraction, Addition, Multiplication, and Division
2. Solving Equations Using More Than One Operation
3. Solving Equations Containing Parentheses
4. Solving Equations with Variables on Both Sides
5. Writing Percent Equations

#### B. Linear Equations and Functions

1. Equations with Two Variables
2. Linear Equations
3. Slope of a Line
4. Slope-Intercept Form
5. The Standard Form
6. Composition of Functions

#### C. Inequalities

1. Solving Inequalities Using Addition, Subtraction, Multiplication, and Division
2. Solving Inequalities Using More Than One Step

#### D. Exponents

1. Finding Powers
2. Multiplying with Exponents
3. Rules for Multiplication
4. Rules for Division
5. Zero as an Exponent
6. Negative Exponents

#### E. Quadratic Equations

1. Quadratic Equations
2. Solving Quadratic Equations
3. Zeros and the Quadratic Formula

#### F. Polynomials and Factoring

1. Polynomials
2. Adding and Subtracting Polynomials
3. Multiplying by a Monomial
4. Factors
5. Factoring by Finding the Greatest Common Factor
6. Factoring Trinomials
7. Using the Zero Product Property

## I. An Introduction to Trigonometry

40%

### A. Angles

1. Classifying Angles
2. Adding and Subtracting Angle Measures
3. Complementary and Supplementary Angles
4. Congruent Angles
5. Vertical Angles
6. Angle Bisectors

### B. Triangles

1. Classifying Triangles by Angles
2. Angle Sum Theorem
3. Exterior Angles of a Triangle
4. Classifying Triangles by Sides

### C. Right Triangles

1. Parts of a Right Triangle
2. Pythagorean Theorem
3. Special Right Triangles

### D. Right Triangle Trigonometry

1. Trigonometric Ratios
2. Tangent Ratio
3. Sine Ratio
4. Cosine Ratio