



**2019-2020 Catholic Schools**  
**Academic Junior High Decathlon**  
**Resource List**

**Theme: Water**

**Team Event: Logic Test**

The Logic Test may contain, but is not limited to, any of the following types of problems:

- |                   |                   |
|-------------------|-------------------|
| Ken Ken           | Sudoku            |
| Cryptograms       | Word problems     |
| Anagrams          | Spatial reasoning |
| Patterns & graphs | Probability       |
| Lateral thinking  | Logic grids       |
| Venn diagrams     | Rebus puzzles     |
| True/False logic  | Kakuro            |
| Word ladders      | Riddles           |
| Logic fallacies   |                   |

The following websites provide excellent sample problems:

<http://www.brainbashers.com>

<http://www.mensa.org/workout.php>

<http://www.mensaforkids.org>

<http://puzzlersparadise.com>

<http://www.sudoku.org.uk>

<http://www.mathisfun.com/puzzles>

<http://www.allstarpuzzles.com>

<http://www.braingle.com/brainteasers>



## 2019-2020 Catholic Schools Academic Junior High Decathlon Resource List

### Team Event: Super Quiz

#### Fine Arts

*An Eye for Art* by the National Gallery of Art  
Chapters 6 and 7

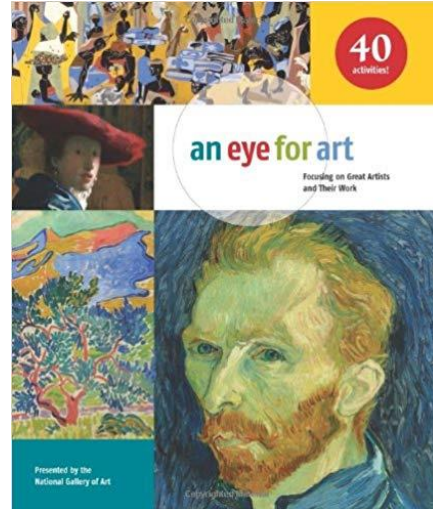
**Paperback:** 180 pages

**Publisher:** Chicago Review Press

**ISBN-10:** 1613748973

**ISBN-13:** 978-1613748978

Available in paperback and Kindle



**Decathletes will only be tested on the following sections:**

Chapter Six – Questioning Traditions, pgs. 120-157

Chapter Seven – Playing with Space, pgs. 158-174

Introduce children ages 7 and up to more than 50 great artists and their work with this lively family-oriented art resource. This treasure trove from the National Gallery of Art features works of art by, among others, Raphael, Rembrandt, Georgia O’Keeffe, Henri Matisse, Chuck Close, Jacob Lawrence, Pablo Picasso, and Alexander Calder, representing a wide array of artistic styles and techniques. Each chapter focuses on a theme ranging from studying nature and observing everyday life to breaking traditions and telling stories and includes works from a broad spectrum of artists, art mediums, nationalities, and time periods.



## 2019-2020 Catholic Schools Academic Junior High Decathlon Resource List

### Team Event: Super Quiz

#### Literature

*Treasure Island* by Robert Louis Stevenson

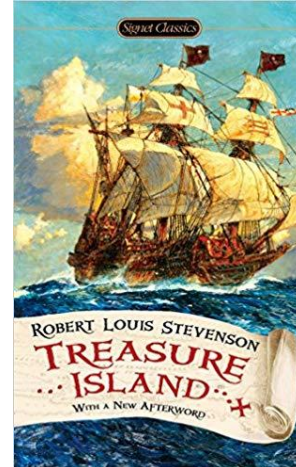
**Paperback:** 240 pages

**Publisher:** Signet

**ISBN-10:** 1101990325

**ISBN-13:** 978-1101990322

Available in hardcover, paperback, Kindle, and Audiobooks



Set in the eighteenth century, *Treasure Island* spins a heady tale of piracy, a mysterious treasure map, and a host of sinister characters charged with diabolical intentions. Seen through the eyes of Jim Hawkins, the cabin boy of the *Hispaniola*, the action-packed adventure tells of a perilous sea journey across the Spanish Main, a mutiny led by the infamous Long John Silver, and a lethal scramble for buried treasure on an exotic isle.

Rich in atmosphere and character, *Treasure Island* continues to mesmerize readers with its perceptive views of the changing nature of human motives.



## 2019-2020 Catholic Schools Academic Junior High Decathlon Resource List

### Team Event: Super Quiz Religion

***Everything Is Sacred: An Introduction to the Sacrament of Baptism*** by Thomas Scirghi, SJ

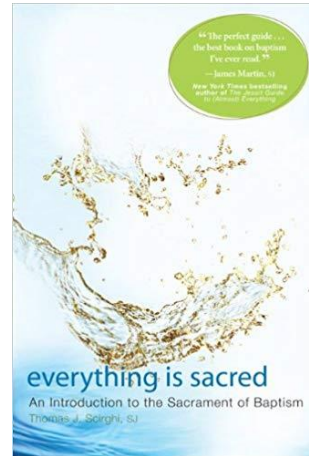
**Paperback:** 162 pages

**Publisher:** Paraclete Press

**ISBN-10:** 1557256764

**ISBN-13:** 978-1557256768

Available in paperback and Kindle



Baptism is the beginning of one's life in the community of the church, and the "gateway" to the rest of the sacraments.

"Thomas Scirghi has written a fine book on baptism for the 21st century church. Rooted deeply in Scripture, the authoritative teaching of the Catholic Church, and the living tradition of sacramental practice, Scirghi's book is laced with literary, cultural, and everyday examples that allow readers to grasp (or grasp anew) the continuing significance of baptism in the life of the Church and in their own lives." –Timothy Brunk, Assistant Professor of Theology, Villanova University



## 2019-2020 Catholic Schools Academic Junior High Decathlon Resource List

### Team Event: Super Quiz

#### Science

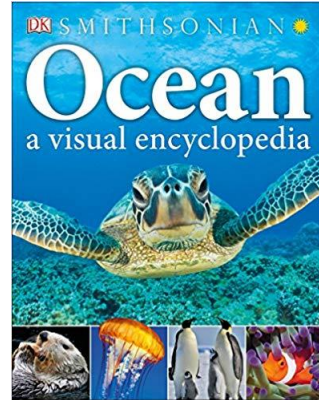
***Ocean: A Visual Encyclopedia*** by DK Smithsonian

**Paperback:** 256 pages

**Publisher:** DK Children

**ISBN-10:** 1465435948

**ISBN-13:** 978-1465435941



Available in hardcover, paperback and eBook

**Decathletes will only be tested on the following sections:**

The Atlas of the Oceans, pg. 6-19

Blue Planet, pg. 20-67

*Ocean: A Visual Encyclopedia* reveals the secrets of the seas through stunning images and beautiful photography to engage and educate kids. From the Arctic to the Caribbean, tiny plankton to giant whales, sandy beaches to the deepest depths, *Ocean: A Visual Encyclopedia* lets your child discover the mysterious world beneath the waves.

Packed with fun facts for kids, this encyclopedia will dazzle your child covering everything from sea creatures and ocean birds to the Great Barrier Reef.



**2019-2020 Catholic Schools**  
**Academic Junior High Decathlon**  
**Resource List**

**Team Event: Super Quiz**

**Social Studies**

***National Geographic Student World Atlas, 5th Edition***

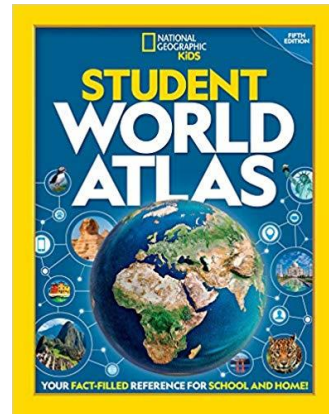
by National Geographic Kids

**Hardcover:** 144 pages

**Publisher:** National Geographic Children's Books; Student edition (July 9, 2019)

**ISBN-10:** 142633480X

**ISBN-13:** 978-1426334801



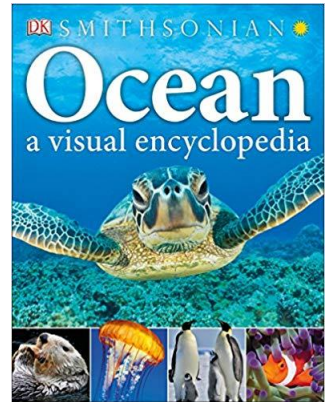
***Ocean: A Visual Encyclopedia*** by DK Smithsonian

**Paperback:** 256 pages

**Publisher:** DK Children

**ISBN-10:** 1465435948

**ISBN-13:** 978-1465435941



**Decathletes will only be tested on the following sections:**

***National Geographic Student World Atlas:***

- The Political World, Human Systems, pgs. 30-53
- North America, Focus On: Natural Hazards, pgs. 68-69
- South America, Focus On: Amazon Rain Forest, pgs. 78-79
- Europe, Focus On: European Waterways, pgs. 88-89
- Asia, Focus On: East Asia Ports, pgs. 98-99
- Africa, Focus On: Protected Areas, pgs. 108-109
- Australia and Oceania, Focus On: Great Barrier Reef, pgs. 118-119
- Antarctica, Focus On: Extreme Environment, pg. 125

***Oceans: A Visual Encyclopedia***

Oceans and Us, pgs. 216-245



## 2019-2020 Catholic Schools Academic Junior High Decathlon Resource List

### Individual Subject Tests:

#### Current Events

News articles for the Current Events Individual Test come out at the end of each month, from September through January, and include information from multiple sources. For the Current Events Test, decathletes will be tested on their knowledge of the information and vocabulary from the news articles. Decathletes should also be familiar with the political leadership and location of countries mentioned in the news articles.

The complete study guides, include the news articles, review questions, vocabulary, worksheets, and quizzes, are available as a subscription service for \$20.00. The subscription service is available through Education Test Creators at <https://www.teacherspayteachers.com/Store/Education-Test-Creators>.

To receive automatic notification when new issues are posted to the Education Test Creators store, click the "Follow Me" button under the Education Test Creators store name. When new products are loaded onto the store, an email message is automatically sent to you. (Note – you may unclick the "Follow Me" button at any time to stop receiving notifications.)

To download the issues, go to the dropdown menu of your [www.teacherspayteachers.com](http://www.teacherspayteachers.com) home page account (click on your account name in the upper right corner of your home page to find the dropdown menu.) Click on the "My Purchases" tab, find the AJHD Current Events file, and click on the "Download Now" button. Download a new file every time an issue is added to the Current Events Study Guide bundle. You may download new files at any time; there is no limit to the number of times you may download files.



## 2019-2020 Catholic Schools Academic Junior High Decathlon Resource List

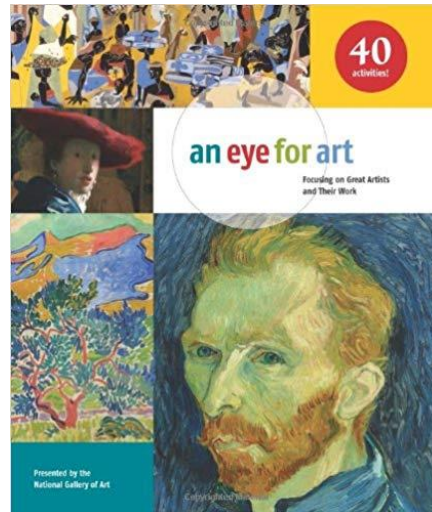
### Individual Subject Tests:

#### Fine Arts

*An Eye for Art* by the National Gallery of Art  
Chapters 1, 2, 3, 4 and 5

**Paperback:** 180 pages  
**Publisher:** Chicago Review Press  
**ISBN-10:** 1613748973  
**ISBN-13:** 978-1613748978

Available in paperback and Kindle



#### **Decathletes will only be tested on the following sections:**

- Chapter 1 – Studying Nature, pgs. 2-23
- Chapter 2 – Exploring Places, pgs. 24-49
- Chapter 3 – Examining Portraits, pgs. 50-67
- Chapter 4 – Telling Stories, pgs. 68-93
- Chapter 5 – Observing Everyday Life, pgs. 94-119

Introduce children ages 7 and up to more than 50 great artists and their work with this lively family-oriented art resource. This treasure trove from the National Gallery of Art features works of art by, among others, Raphael, Rembrandt, Georgia O’Keeffe, Henri Matisse, Chuck Close, Jacob Lawrence, Pablo Picasso, and Alexander Calder, representing a wide array of artistic styles and techniques. Each chapter focuses on a theme ranging from studying nature and observing everyday life to breaking traditions and telling stories and includes works from a broad spectrum of artists, art mediums, nationalities, and time periods.





## 2019-2020 Catholic Schools Academic Junior High Decathlon Resource List

### Individual Subject Tests:

#### English

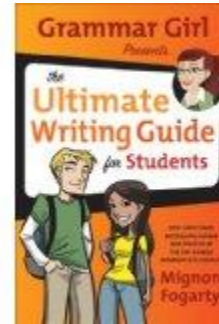
***Grammar Girl Presents the Ultimate Writing Guide for Students,***  
by Mignon Fogarty

**Paperback:** 304 pages

**Publisher:** St. Martin's Griffin

**ISBN-10:** 0805089446

**ISBN-13:** 978-0805089448



Available in Kindle and paperback versions

*Grammar Girl Presents the Ultimate Writing Guide for Students* is a complete and comprehensive guide to all things grammar. Complete with a writing style chapter and a guide to the different kinds of writing--everything from school papers to letter writing to e-mails--this guide is sure to become the one-stop, essential book on every student's desk.

#### **Conventions of Standard English:**

##### CCSS.ELA-LITERACY.L.8.1

Demonstrate command of the conventions of Standard English grammar and usage when writing or speaking.

##### CCSS.ELA-LITERACY.L.8.1.A

Explain the function of verbals (gerunds, participles, infinitives) in general and their function in particular sentences.

##### CCSS.ELA-LITERACY.L.8.1.B

Form and use verbs in the active and passive voice.

##### CCSS.ELA-LITERACY.L.8.1.C

Form and use verbs in the indicative, imperative, interrogative, conditional, and subjunctive mood.

##### CCSS.ELA-LITERACY.L.8.1.D

Recognize and correct inappropriate shifts in verb voice and mood.



## 2019-2020 Catholic Schools Academic Junior High Decathlon Resource List

### CCSS.ELA-LITERACY.L.8.2

Demonstrate command of the conventions of Standard English capitalization, punctuation, and spelling when writing.

#### CCSS.ELA-LITERACY.L.8.2.A, B and C

Use punctuation (comma, ellipsis, dash) to indicate a pause or break. Use an ellipsis to indicate an omission. Spell correctly.

### ***Knowledge of Language:***

### CCSS.ELA-LITERACY.L.8.3

Use knowledge of language and its conventions when writing, speaking, reading, or listening.

#### CCSS.ELA-LITERACY.L.8.3.A

Use verbs in the active and passive voice and in the conditional and subjunctive mood to achieve particular effects (e.g., emphasizing the actor or the action; expressing uncertainty or describing a state contrary to fact).

### ***Vocabulary Acquisition and Use:***

### CCSS.ELA-LITERACY.L.8.4

Determine or clarify the meaning of unknown and multiple-meaning words or phrases based on *grade 8 reading and content*, choosing flexibly from a range of strategies.

#### CCSS.ELA-LITERACY.L.8.4.A

Use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

#### CCSS.ELA-LITERACY.L.8.4.B

Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word (e.g., *precede*, *recede*, *secede*).



## 2019-2020 Catholic Schools Academic Junior High Decathlon Resource List

### Individual Subject Tests:

#### Literature

*Many Waters* by Madeleine L'Engle

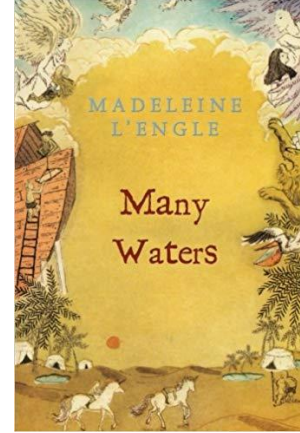
**Paperback:** 368 pages

**Publisher:** Square Fish; Reprint edition

**ISBN-10:** 0312368577

**ISBN-13:** 978-0312368579

Available in paperback, Kindle, and Audiobooks



Sandy and Dennys have always been the normal, run-of-the-mill ones in the extraordinary Murry family. Nothing especially interesting has happened to the twins until they accidentally interrupt their father's experiment.

Then the two boys are thrown across time and space. They find themselves alone in the desert, where, if they believe in unicorns, they can find unicorns, and whether they believe or not, mammoths and manticores will find them.

Japheth, a man from the nearby oasis, rescues the twins but before he can bring them to safety, Dennys gets lost. Each boy is quickly embroiled in the conflicts of this time and place, whose populations includes winged seraphim, a few stray mythic beasts, perilous and beautiful Nephilim, and small, long lived humans who consider Sandy and Dennys giants. The boys find they have more to do in the oasis than simply getting themselves home--they have to reunite an estranged father and son, but it won't be easy, especially when the son is named Noah and he's about to start building a boat in the desert.



## 2019-2020 Catholic Schools Academic Junior High Decathlon Resource List

### Individual Subject Tests:

#### Math

The math standards for the 2020 AJHD competition are based on the California Department of Education Higher Mathematics Content Standards for seventh and eighth grades.

Extend the properties of exponents to rational exponents. Use properties of rational and irrational numbers.

1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.

*For example, we define  $5^{1/3}$  to be the cube root of 5 because we want  $(5^{1/3})^3 = 5^{(1/3)3}$  to hold, so  $(5^{1/3})^3$  must equal 5.*

2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.
3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

#### **Reason quantitatively and use units to solve problems.**

1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
2. Define appropriate quantities for the purpose of descriptive modeling.
3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.



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**Perform arithmetic operations on polynomials.** [Linear and quadratic]

1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

**Interpret the structure of expressions.** [Linear, exponential, and quadratic]

**Write expressions in equivalent forms to solve problems.** [Quadratic and exponential]

1. Interpret expressions that represent a quantity in terms of its context.
  - a. Interpret parts of an expression, such as terms, factors, and coefficients.
  - b. Interpret complicated expressions by viewing one or more of their parts as a single entity.  
*For example, interpret  $P(1+r)^x$  as the product of  $P$  and a factor not depending on  $P$ .*
2. Use the structure of an expression to identify ways to rewrite it.
3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
  - a. Factor a quadratic expression to reveal the zeros of the function it defines.
  - b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
  - c. Use the properties of exponents to transform expressions for exponential functions.  
*For example, the expression  $1.15^t$  can be rewritten as  $(1.15^{1/12})^{12t} \approx 1.012^{12t}$  to reveal the approximate equivalent monthly interest rate if the annual rate is 15%*

**Create equations that describe numbers or relationships.** [Linear, quadratic, and exponential (integer inputs only)]

1. Create equations and inequalities in one variable including ones with absolute value and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*
2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.



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3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law  $V = IR$  to highlight resistance  $R$ .

**Solve equations and inequalities in one variable.** [Linear inequalities; literal equations that are linear in the variables being solved for; quadratics with real solutions]

1. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
2. Solve one-variable equations and inequalities involving absolute value, graphing the solutions and interpreting them in context.
3. Solve quadratic equations in one variable.
  - a. Use the method of completing the square to transform any quadratic equation in  $x$  into an equation of the form  $(x - p)^2 = q$  that has the same solutions. Derive the quadratic formula from this form.
  - b. Solve quadratic equations by inspection (e.g., for  $x^2 = 49$ ), taking square roots, completing the square, the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as  $a \pm bi$  for real numbers  $a$  and  $b$ .

**Solve systems of equations.** [Linear-linear and linear-quadratic]

**Represent and solve equations and inequalities graphically.** [Linear and exponential]

1. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
2. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
3. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
4. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).



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5. Explain why the  $x$ -coordinates of the points where the graphs of the equations  $y = f(x)$  and  $y = g(x)$  intersect are the solutions of the equation  $f(x) = g(x)$ ; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where  $f(x)$  and/or  $g(x)$  are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
6. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

**Understand the concept of a function and use function notation.** [Linear, exponential, arithmetic and geometric sequences.]

**Interpret functions that arise in applications in terms of the context.** [Linear, exponential, and quadratic]

**Analyze functions using different representations.** [Linear, exponential, quadratic, absolute value]

1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If  $f$  is a function and  $x$  is an element of its domain, then  $f(x)$  denotes the output of  $f$  corresponding to the input  $x$ . The graph of  $f$  is the graph of the equation  $y = f(x)$ .
2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.  
*For example, the Fibonacci sequence is defined recursively by  $f(0) = f(1) = 1$ ,  $f(n + 1) = f(n) + f(n - 1)$  for  $n \geq 1$ .*
4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.



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5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.  
*For example, if the function  $h$  gives the number of person-hours it takes to assemble  $n$  engines in a factory, then the positive integers would be an appropriate domain for the function.*
6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
  - a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
  - b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
  - c. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
  - a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
  - b. Use the properties of exponents to interpret expressions for exponential functions.  
*For example, identify percent rate of change in functions such as  $y = (1.02)^t$ ,  $y = (0.97)^t$ ,  $y = (1.01)^{12t}$ , and  $y = (1.2)^{t/10}$ , and classify them as representing exponential growth or decay.*
9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).  
*For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*





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**Build a function that models a relationship between two quantities.**

**Build new functions from existing functions.** [Linear, exponential, quadratic, and absolute value]

1. Write a function that describes a relationship between two quantities.
  - a. Determine an explicit expression, a recursive process, or steps for calculation from a context.
  - b. Combine standard function types using arithmetic operations.  
*For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*
2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
3. Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $kf(x)$ ,  $f(kx)$ , and  $f(x + k)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  given the graphs. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
4. Find inverse functions.
  - a. Solve an equation of the form  $f(x) = c$  for a simple function  $f$  that has an inverse and write an expression for the inverse.

**Construct and compare linear, quadratic, and exponential models and solve problems.**

**Interpret expressions for functions in terms of the situation they model.**

1. Distinguish between situations that can be modeled with linear functions and with exponential functions.
  - a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
  - b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
  - c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.



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4. Interpret the parameters in a linear or exponential function in terms of a context. [Linear and exponential of form  $f(x) = bx + k$ ]
5. Apply quadratic functions to physical problems, such as the motion of an object under the force of gravity.

**Summarize, represent, and interpret data on a single count or measurement variable.**

**Summarize, represent, and interpret data on two categorical and quantitative variables.**

**Interpret linear models.**

1. Represent data with plots on the real number line (dot plots, histograms, and box plots).
2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
4. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
5. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
  - a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
  - b. Informally assess the fit of a function by plotting and analyzing residuals.
  - c. Fit a linear function for a scatter plot that suggests a linear association.
6. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
7. Compute (using technology) and interpret the correlation coefficient of a linear fit.
8. Distinguish between correlation and causation.



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### **Experiment with transformations in the plane.**

1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
2. Describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
4. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

### **Understand similarity in terms of similarity transformations.**

1. Use the Pythagorean Theorem to solve right triangles in applied problems.
2. Derive and use the trigonometric ratios for special right triangles ( $30^\circ$ ,  $60^\circ$ ,  $90^\circ$  and  $45^\circ$ ,  $45^\circ$ ,  $90^\circ$ ).

### **Understand and apply theorems about circles.**

**Find arc lengths and areas of sectors of circles.** [Radian introduced only as unit of measure]

1. Prove that all circles are similar.
2. Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*
3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.



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4. Construct a tangent line from a point outside a given circle to the circle.
5. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector. Convert between degrees and radians.

### **Translate between the geometric description and the equation for a conic section.**

**Use coordinates to prove simple geometric theorems algebraically.** [Include distance formula; relate to Pythagorean Theorem.]

1. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
2. Derive the equation of a parabola given a focus and directrix.
3. Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point  $(1, \sqrt{3})$  lies on the circle centered at the origin and containing the point  $(0, 2)$ .
4. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
5. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
6. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.



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**Explain volume formulas and use them to solve problems.**

**Visualize relationships between two-dimensional and three-dimensional objects.**

**Apply geometric concepts in modeling situations.**

1. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.
2. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
3. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
4. Know that the effect of a scale factor  $k$  greater than zero on length, area, and volume is to multiply each by  $k$ ,  $k^2$ , and  $k^3$ , respectively; determine length, area and volume measures using scale factors.
5. Verify experimentally that in a triangle, angles opposite longer sides are larger, sides opposite larger angles are longer, and the sum of any two side lengths is greater than the remaining side length; apply these relationships to solve real- world and mathematical problems.
6. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
7. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

**Understand independence and conditional probability and use them to interpret data.**

**Use the rules of probability to compute probabilities of compound events in a uniform probability model.**

**Use probability to evaluate outcomes of decisions.**

1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").
2. Understand that two events  $A$  and  $B$  are independent if the probability of  $A$  and  $B$  occurring together is the product of their probabilities, and use this characterization to determine if they are independent.



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3. Understand the conditional probability of  $A$  given  $B$  as  $P(A \text{ and } B)/P(B)$ , and interpret independence of  $A$  and  $B$  as saying that the conditional probability of  $A$  given  $B$  is the same as the probability of  $A$ , and the conditional probability of  $B$  given  $A$  is the same as the probability of  $B$ .
4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.  
*For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*
5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.
6. Find the conditional probability of  $A$  given  $B$  as the fraction of  $B$ 's outcomes that also belong to  $A$ , and interpret the answer in terms of the model.
7. Apply the Addition Rule,  $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ , and interpret the answer in terms of the model.
8. Apply the general Multiplication Rule in a uniform probability model,  $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$ , and interpret the answer in terms of the model.
9. Use permutations and combinations to compute probabilities of compound events and solve problems.
10. Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).
11. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).



## 2019-2020 Catholic Schools Academic Junior High Decathlon Resource List

### Individual Subject Tests:

#### Religion

##### ***The Catholic Way, Faith for Living Today***

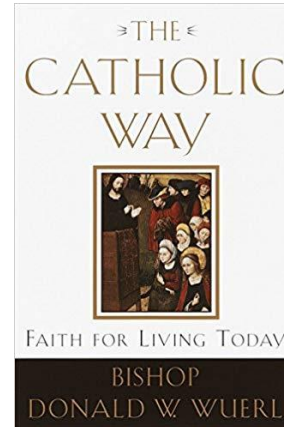
by Bishop Donald W. Wuerl

**Paperback:** 384 pages

**Publisher:** Image

**ISBN-10:** 038550182X

**ISBN-13:** 978-0385501828



Available in paperback and Kindle

**Decathletes will only be tested on the following sections:**

Chapters 1 through 33, pgs. 1-143

*The Catholic Way* is an up-to-date reflection on what it means to be a Catholic today. It is a clear, intelligent, and authoritative guide to the perennial faith of the Catholic Church as presented in the *Catechism of the Catholic Church*. Written by a bishop recognized internationally and nationally for his teaching and writing, and for producing video presentations on the Catholic faith, this indispensable book illuminates the riches of the Catholic Church, guiding readers -- whether recent converts or lifelong Catholics -- to a deeper understanding and appreciation of the Church.

In concise, easy-to-understand language, Bishop Wuerl explains what the Church's *Catechism* is and how its content touches our life. He elucidates the words of the Sacred Scripture, the meaning of Jesus' life and ministry, Mary's place and significance within the Church's teachings, what the articles of the creed mean, what the sacraments signify, and how the commandments apply to us today. His insights provide answers to the questions "What do we believe?" and "Why do we believe that?"



## 2019-2020 Catholic Schools Academic Junior High Decathlon Resource List

### Individual Subject Tests:

#### Science

***Ocean: A Visual Encyclopedia*** by DK Smithsonian

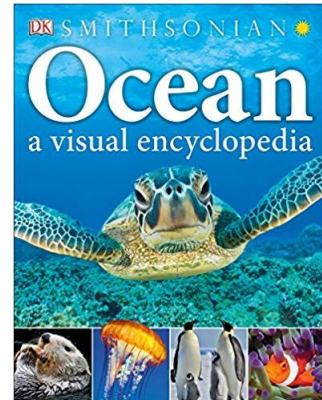
**Paperback:** 256 pages

**Publisher:** DK Children

**ISBN-10:** 1465435948

**ISBN-13:** 978-1465435941

Available in hardcover, paperback and eBook



#### **Decathletes will only be tested on the following sections:**

The Open Ocean, pg. 68-104

Shallow Seas, pg. 106-142

Coast and Seashore, pg. 144-185

Polar Seas, pg. 186-214

*Ocean: A Visual Encyclopedia* reveals the secrets of the seas through stunning images and beautiful photography to engage and educate kids. From the Arctic to the Caribbean, tiny plankton to giant whales, sandy beaches to the deepest depths, *Ocean: A Visual Encyclopedia* lets your child discover the mysterious world beneath the waves.

Packed with fun facts for kids, this encyclopedia will dazzle your child covering everything from sea creatures and ocean birds to the Great Barrier Reef.





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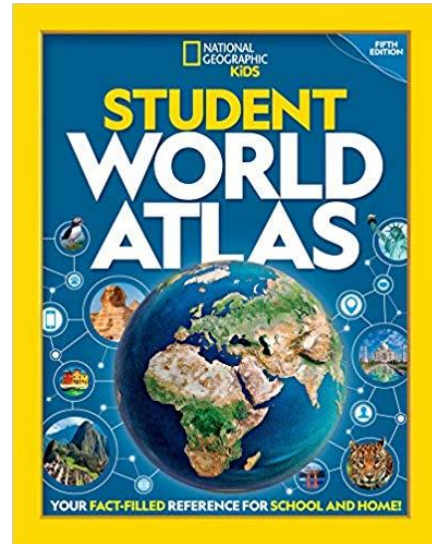
### Individual Subject Tests:

#### Social Studies

***National Geographic Student World Atlas,  
5th Edition Student Edition***  
by National Geographic Kids

**Hardcover:** 144 pages  
**Publisher:** National Geographic Children's Books;  
Student edition (July 9, 2019)  
**ISBN-10:** 142633480X  
**ISBN-13:** 978-1426334801

Available in hardcover and paperback



#### **Decathletes will only be tested on the following sections:**

About the Earth, pgs. 4-5  
Learning about Maps, pgs. 6-13  
Physical Systems, pgs. 14-29  
North America, pgs. 54-56, 58-59, 62, 64, 66  
South America, pgs. 70-72, 74-75  
Europe, pgs. 80-82, 84-85  
Asia, pgs. 90-92, 94-95  
Africa, pgs. 100-102, 104-105  
Australia and Oceania, pgs. 110-112, 114-115  
Antarctica, pgs. 120-123

**Test will focus on the physical geography of the world, including rivers, lakes, and oceans.**



## 2019-2020 Catholic Schools Academic Junior High Decathlon Resource List

### Optional Individual Subject Test:

#### Writing

The Academic Junior High Decathlon program is offering an optional individual writing test. The individual writing test is a timed-essay competition. Writers will be assessed based on the Common Core Standard for Literacy listed below. Awards will be given for first, second, and third place.

The individual writing test will be administered approximately two weeks before the diocesan Academic Decathlon competition. The date, time, and place for the individual writing test will be provided by the diocesan Academic Decathlon coordinator.

As this is an optional test, points awarded in the writing test competition will not be used to determine the overall team scores for the Academic Junior High Decathlon.

**The following resource is not required for the AJHD test, and is listed only as a recommended aid in preparing for the test:**

*The Little Red Writing Book* by Brandon Royal

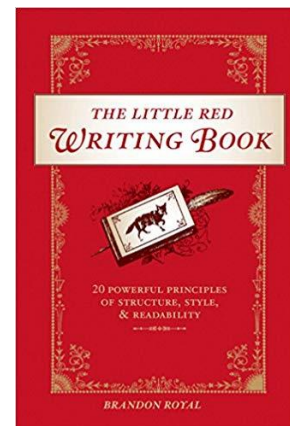
**Paperback:** 160 pages

**Publisher:** Writer's Digest Books

**ISBN-10:** 9781582975214

**ISBN-13:** 978-1582975214

Available in hardcover, paperback, and Kindle



#### CSS.ELA-LITERACY.W.8.2

Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

##### CCSS.ELA-LITERACY.W.8.2.A

Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.



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### CCSS.ELA-LITERACY.W.8.2.B

Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.

### CCSS.ELA-LITERACY.W.8.2.C

Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.

### CCSS.ELA-LITERACY.W.8.2.D

Use precise language and domain-specific vocabulary to inform about or explain the topic.

### CCSS.ELA-LITERACY.W.8.2.E

Establish and maintain a formal style.

### CCSS.ELA-LITERACY.W.8.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented.

## AJHD Coaching Handbook

An essential resource for both new and experienced coaches, the AJHD Coaching Handbook contains the official rules for the AJHD competitions, contact information for your AJHD diocesan coordinators, and instructions on how to access the new BASECAMP site for news and updates. **The handbook also covers important changes to the AJHD competitions (5,000 points for Logic, 5,000 points for Super Quiz, and 50 minute time limits for Logic and individual tests).** Need some additional tips for preparing a team to compete at the Catholic Schools Academic Junior High Decathlon? Try out the organizer charts, sign-up sheets, and study tips.

The updated 2019-2020 AJHD Coaching Handbook is available to download for free at <https://www.teacherspayteachers.com/Product/2018-AJHD-Coach-Handbook-3423349> and on the AJHD Basecamp website at <https://3.basecamp.com/3544105/join/wUC4gyrpwKsW>.



## 2019-2020 Catholic Schools Academic Junior High Decathlon Resource List

### Optional Study Guides

Education Test Creators, the official test writers for the 2019 - 2020 Academic Junior High Decathlon, produce study guides for the books and materials listed on the AJHD Resource List. The study guides feature review questions, vocabulary lists, worksheets, quizzes, and multiple-choice practice tests for each subject area. Studies guides from Education Test Creators are available for purchase at <https://www.teacherspayteachers.com/Store/Education-Test-Creators>.

Education Test Creators produces the study guides in order to aid decathletes in preparing for the AJHD competitions. It is not required that teams purchase the study guides in order to participate in the AJHD program.