



**SPRING GROVE AREA SCHOOL DISTRICT**



**PLANNED COURSE OVERVIEW**

<b>Course Title:</b> Mathematics and Sports <b>Grade Level(s):</b> 9-12 <b>Units of Credit:</b> .5 <b>Classification:</b> Elective	<b>Length of Course:</b> Half Year <b>Periods Per Cycle:</b> 6 <b>Length of Period:</b> 40 Minutes <b>Total Instructional Time:</b> 60 Hours
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***Course Description***

The course will explore the application of algebra, geometry, and statistical concepts in athletics. Students will complete projects, analyze data, and solve problems within the sports field, including analysis of salary structure, team/individual data collection, and geometric applications to various sports.

***Instructional Strategies, Learning Practices, Activities, and Experiences***

Critical Thinking Guided Practice Warm-up / Closures	Class Discussions Flexible Groups Best Practices Strategies	Teacher Demonstrations Project Examples Hands on Projects
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***Assessments***

Written Tests	Application Projects / Exercises	Verbal Discussions
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***Materials/Resources***

Teacher Generated Materials		
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**Adopted:** 5/22/23

**Revised:**

[https://springgroveareascho.sharepoint.com/sites/PrivateSGASD/Shared Documents/AASG/NEWCURR/Math/2023/Mathematics and Sports/Mathematics and Sports\\_Overview & Curriculum.docx](https://springgroveareascho.sharepoint.com/sites/PrivateSGASD/Shared Documents/AASG/NEWCURR/Math/2023/Mathematics and Sports/Mathematics and Sports_Overview & Curriculum.docx)

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Sports History</b></p> <ul style="list-style-type: none"> <li>• Timeline for Individual Sports</li> <li>• Changes in the Rules and the Equipment of Sports</li> <li>• Famous Franchises</li> <li>• Record Setting Performances (Single Game/Career)</li> <li>• Sports Related Superstitions</li> </ul>	<p><b>CC.2.4.HS.B.1</b> Summarize, represent, and interpret data on a single count or measurement variable.</p> <p><b>CC.2.4.HS.B.3</b> Analyze linear models to make interpretations based on the data.</p> <p><b>CC.2.2.HS.C.6</b> Interpret functions in terms of the situations they model.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Geometric Figures</b></p> <ul style="list-style-type: none"> <li>• Measurement Accuracy</li> <li>• Properties of Parallelograms, Triangles, and Circles as Related to Playing Fields</li> <li>• Area</li> <li>• Volume</li> <li>• Pythagorean Thm</li> <li>• Regular/Irregular Shapes</li> </ul>	<p><b>CC.2.1.HS.F.1</b> Apply and extend the properties of exponents to solve problems with rational exponents.</p> <p><b>CC.2.1.HS.F.2</b> Apply properties of rational and irrational numbers to solve real-world or mathematical problems.</p> <p><b>CC.2.1.HS.F.3</b> Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.</p> <p><b>CC.2.2.HS.D.2</b> Write expressions in equivalent forms to solve problems.</p> <p><b>CC.2.2.HS.D.9</b> Use reasoning to solve equations and justify the solution method.</p> <p><b>CC.2.3.HS.A.3</b> Verify and apply geometric theorems as they relate to geometric figures.</p> <p><b>CC.2.3.HS.A.6</b> Verify and apply theorems involving similarity as they relate to plane figures.</p> <p><b>CC.2.3.HS.A.8</b> Apply Geometric theorems to verify properties of circles.</p> <p><b>CC.2.3.HS.A.14</b> Apply geometric concepts to model and solve real world problems.</p> <p><b>CC.2.3.HS.A.7</b> Apply trigonometric ratios to solve problems involving right triangles.</p> <p><b>CC.2.2.HS.C.9</b> Prove the Pythagorean identity and use it to calculate trigonometric ratios.</p> <p><b>CC.2.3.HS.A.12</b> Explain volume formulas and use them to solve problems.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Data Collection/Analysis</b></p> <ul style="list-style-type: none"> <li>• Salaries</li> <li>• Fan Costs</li> <li>• Franchise Value and Revenue</li> <li>• Individual and Team Performances</li> <li>• Win/Loss Percentages</li> <li>• Methods of Averaging</li> <li>• Interpreting Data and Graphs</li> </ul>	<p><b>CC.2.1.HS.F.3</b> Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.</p> <p><b>CC.2.2.HS.C.3</b> Write functions or sequences that model relationships between two quantities.</p> <p><b>CC.2.2.HS.D.7</b> Create and graph equations or inequalities to describe numbers or relationships.</p> <p><b>CC.2.2.HS.D.8</b> Apply inverse operations to solve equations or formulas for a given variable.</p> <p><b>CC.2.2.HS.D.9</b> Use reasoning to solve equations and justify the solution method.</p> <p><b>CC.2.2.HS.D.10</b> Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.</p> <p><b>CC.2.4.HS.B.1</b> Summarize, represent, and interpret data on a single count or measurement variable.</p> <p><b>CC.2.4.HS.B.3</b> Analyze linear models to make interpretations based on the data.</p> <p><b>CC.2.2.HS.C.6</b> Interpret functions in terms of the situations they model.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Probability/Chance</b></p> <ul style="list-style-type: none"> <li>• Use Data for Predictions of Outcomes</li> <li>• Dependent vs Independent Variables Impact Individual Performances</li> <li>• Methods of Data Collection</li> <li>• Ranking vs Ratings</li> <li>• Testing Traditional Theories of Play</li> <li>• Sports Gambling</li> <li>• Interpreting Data and Graphs</li> </ul>	<p><b>CC.2.1.HS.F.3</b> Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.</p> <p><b>CC.2.2.HS.C.3</b> Write functions or sequences that model relationships between two quantities.</p> <p><b>CC.2.2.HS.D.7</b> Create and graph equations or inequalities to describe numbers or relationships.</p> <p><b>CC.2.2.HS.D.8</b> Apply inverse operations to solve equations or formulas for a given variable.</p> <p><b>CC.2.2.HS.D.9</b> Use reasoning to solve equations and justify the solution method.</p> <p><b>CC.2.2.HS.D.10</b> Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.</p> <p><b>CC.2.4.HS.B.1</b> Summarize, represent, and interpret data on a single count or measurement variable.</p> <p><b>CC.2.4.HS.B.3</b> Analyze linear models to make interpretations based on the data.</p> <p><b>CC.2.2.HS.C.6</b> Interpret functions in terms of the situations they model.</p> <p><b>CC.2.4.HS.B.4</b> Recognize and evaluate random processes underlying statistical experiments.</p> <p><b>CC.2.4.HS.B.5</b> Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.</p> <p><b>CC.2.4.HS.B.6</b> Use the concepts of independence and conditional probability to interpret data.</p> <p><b>CC.2.4.HS.B.7</b> Apply the rules of probability to compute probabilities of compound events in a uniform probability model.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Objects in Motion</b></p> <ul style="list-style-type: none"> <li>• Trajectory of Sports Objects</li> <li>• Density</li> <li>• Surface Area</li> <li>• Concussion Rates</li> <li>• Advancement in Sporting Equipment</li> <li>• Rates of Change</li> <li>• Interpreting Data and Graphs</li> </ul>	<p><b>CC.2.4.HS.B.2</b> Summarize, represent, and interpret data on two categorical and quantitative variables.</p> <p><b>CC.2.4.HS.B.3</b> Analyze linear models to make interpretations based on the data.</p> <p><b>CC.2.2.HS.C.1</b> Use the concept and notation of functions to interpret and apply them in terms of their context.</p> <p><b>CC.2.2.HS.C.2</b> Graph and analyze functions and use their properties to make connections between the different representations.</p> <p><b>CC.2.2.HS.C.3</b> Write functions or sequences that model relationships between two quantities.</p> <p><b>CC.2.2.HS.C.5</b> Construct and compare linear, quadratic, and exponential models to solve problems.</p> <p><b>CC.2.2.HS.C.6</b> Interpret functions in terms of the situations they model.</p> <p><b>A1.2.1.2</b> Interpret and/or use linear functions and their equations, graphs, or tables.</p> <p><b>A.1.2.2.1</b> Describe, compute, and/or use the rate of change (slope) of a line.</p> <p><b>HS-PS2-1</b> Analyze data to support the claim that Newton’s second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.</p> <p><b>HS-PS2-2</b> Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.</p> <p><b>HS-PS2-3</b> Apply science and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.*</p> <p><b>HS-PS2-4</b> Use mathematical representations of Newton’s Law of Gravitation and Coulomb’s Law to describe and predict the gravitational and electrostatic forces between objects.</p> <p><b>HS-PS2-5</b> Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.</p> <p><b>HS-PS2-6</b> Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.</p>

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<p><b>Health / Training</b></p> <ul style="list-style-type: none"> <li>• Nutrition</li> <li>• Metabolic States</li> <li>• Life Expectancies in Athletes</li> </ul>	<p><b>CC.2.4.HS.B.2</b> Summarize, represent, and interpret data on two categorical and quantitative variables.</p> <p><b>CC.2.4.HS.B.3</b> Analyze linear models to make interpretations based on the data.</p> <p><b>CC.2.2.HS.C.1</b> Use the concept and notation of functions to interpret and apply them in terms of their context.</p> <p><b>CC.2.2.HS.C.2</b> Graph and analyze functions and use their properties to make connections between the different representations.</p> <p><b>CC.2.2.HS.C.3</b> Write functions or sequences that model relationships between two quantities.</p> <p><b>CC.2.2.HS.C.5</b> Construct and compare linear, quadratic, and exponential models to solve problems.</p> <p><b>CC.2.2.HS.C.6</b> Interpret functions in terms of the situations they model.</p>