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|  | Unit Planner: **SYSTEMS** Math 1  Tuesday, July 21, 2015, 5:25PM |  |

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| District Wide > 2015-2016 > High School > Mathematics > Math 1 > Week 7 - Week 8 | Last Updated: Monday, July 13, 2015 by Mary Wible |

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| |  | | --- | | Big Idea / Conceptual Lens |   Equilibrium | |  | | --- | | Focus of Study |   Solving **systems** using algebraic methods.  Representing & solving equations and inequalities graphically.  Modeling relationships between quantities using **systems** of equations.  Using parallel & perpendicular slopes to prove geometric theorems algebraically. |
| |  | | --- | | Standards and Clarifying Objectives |   Choose Standards   |  |  |  | | --- | --- | --- | | ComCore: Mathematics | | | | **ComCore: HS: Algebra** | | | | Creating Equations | | | | **HSA-CED.A. Create equations that describe numbers or relationships.** | | | |  | HSA-CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.  Show details  HSA-CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.  Hide details  For example, represent inequalities describing nutritional and cost constraints on combinations of different foods. |  | | Reasoning with Equations & Inequalities | | | | **HSA-REI.C. Solve systems of equations.** | | | |  | HSA-REI.C.5. 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. |  | |  | HSA-REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. |  | | **HSA-REI.D. Represent and solve equations and inequalities graphically.** | | | |  | HSA-REI.D.11. 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. |  | |  | HSA-REI.D.12. 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. |  | | **ComCore: HS: Geometry** | | | | Expressing Geometric Properties with Equations | | | | **HSG-GPE.B. Use coordinates to prove simple geometric theorems algebraically** | | | |  | HSG-GPE.B.5. 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). |  | | |  | | --- | | Enduring Understandings |   [Bloom's Taxonomy](http://community.wvu.edu/~lsm018/Articulate%20Blooms%20Wheel/blooms_wheel.html)  **Systems** model multiple relationships using the same unknown quantities.  Solutions to a **system** make both equations true.  **Systems** of equations have multiple equivalent representations & methods of solutions.  Parallel & perpendicular slopes model a specific relationship of the rate of change between coordinates. |
| |  | | --- | | Essential Concepts and Critical Content |   **Concepts**  Equivalence (forms of linear equations)  **System**  Solution  (Review parallel & perpendicular, at least/at most, maximum/minimum)  **Key vocab**  Viable  satisfies ("satisfies the **system**")  **Critical Content**  Identify & apply parallel & perpendicular slopes. (G.GPE.5)  Write equations of lines. (G.GPE.5)  Solve a **systems** of equations with and without context. (A.REI.6)  Identify& compare solutions to **systems** (A.REI.11)  Graph a **system** of inequalities. (A.REI.12)  Identify maximum or minimum solutions in linear context (pre-linear programming) (A.CED.3)  \*See attachment below for learning targets.  [Learning Targets for Systems.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50416&) | |  | | --- | | Processes, Strategies, and Skills |   ***8 Mathematical Practices:***  ***MP 1 Make sense of problems, & persevere.***  ***MP 2 Reasoning abstractly & quantitatively.***  **MP 3 Critiquing reasoning of others & justifying own work.**  ***MP 4 Model with mathematics.***  ***MP 5 Use tools of appropriately.***  ***MP 6 Attend to precision.***  ***MP 7 Seeing Structure.***  ***MP 8 Seeing regularity in repeated reasoning & patterns.***  In addition to the processes addressed in earlier units...  **Process #4 - (connects to MP1,5,6,7,8)**  Organizing information, time, and materials.  **Strategies**  Prioritize essential topics, tools and tasks.  Eliminate unnecessary or distracting information or items.  Identify actions or steps required.  **Skills**  Create charts, tables, lists.  Set specific objectives.  Establish deadlines.  Self-monitor & assess. |
| |  | | --- | | Essential Questions |   \*The number in front indicates the Enduring Understanding that the EQ facilitates thinking towards.  **Factual**  How do I solve **systems** of linear equations & inequalities with two variables?  How do I represent the solutions a **system** of equations or inequalities?  How can I model a linear relationship?  What types of relationships can be modeled by a **system** of equations?  How do I write a **system** of linear equations to model situations?  How are parallel & perpendicular slopes determined from coordinates & from equations?  **Conceptual**  What is a solution for a **system** of equations & a **system** of inequalities?  How many solutions can there be for a **system** of equations & a **system** of inequalities?  What do the solutions for a **system** of equations & a **system** of inequalities look like?  How are tables, graphs, and other representations of **systems** related to each other?  What information does a **system** of equations provide about the relationship it models?  How do parallel slopes relate to solutions of **systems** of equations?  How are parallel & perpendicular slopes used to prove geometric theorems?  **Provocative**  What conditions impact the type and number of possible solutions?  When is one method for solving a **system** more appropriate than another?  How does the ability to identify an equilibrium point impact real world decisions?  How do parallel slopes manifest in real word situations? | |  | | --- | | Resources/Materials |   Resources attached below:  #1 - Very scaffolded parallel & perpendicular slope task  #2 - Link to Desmos website which has a easy to use tool for graphing lines & creating tables. Use as an alternative method to do the next parallel & perpendicular slope investigation.(#3)  #3 - 30 **systems** presented in slope-intercept form. Cut out & have assign one graph per student to be done on poster paper, then refer to the graphs for class discussion to identify characteristics of slopes of parallel & perpendicular lines. OR have students graph the eq. with Desmos, noting which are parallel, perpendicular or other & follow up with discussion.  #4 - Students are given clue sets to find the equations of lines.  #5 - MATHSHELL lesson requiring students to complete & match up sets of equations that would have one, no, or infinite solutions. Includes pre & post assessment task.  #6-9 Four sets of word problems using **systems**. Clustered so students will practice one type of problem at a time.  #10 - Chart of coffee sales requiring students to read & interpret information in a novel way.Includes analysis of student samples & rubric.  #11 - Real world problem (not a **system** of linear equations - but uses same concept).  #12 -MATHSHELL lesson requiring students to graph several inequalitites to identify where a specific "treasure is buried".  [parperp slopes guided invest.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50396&) [graph, table & regression tool](https://www.desmos.com/) [par&perp invest.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50397&) [Eq of Lines Put It Together Clues.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50393&) [classifying\_solutions\_to\_systems\_of\_equations\_MATHSHELL.pdf](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50394&) [Problem Solving with Parallel.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50395&) [ProbSolv - systems graphing.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50390&) [Prob Solv - systems sub & elim.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50391&) [ProbSolv - systems mix.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50389&) [coffee-chart & rubric.pdf](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50384&) [SCHOOL DANCE PROBLEM.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50385&) [defining\_regions\_using\_inequalities\_complete.pdf](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50388&) |
| |  | | --- | | Formative, Interim, and Summative Assessments |   Add New Assessment   |  |  | | --- | --- | |  | UNIT TEST A (no exponential)  Summative: Test: Post Test  14 multiple choice & open ended questions on A.REI.6, 11, 12 and A.CED.3 and G.GPE.5  [UNIT TEST Math 1 Systems.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50399&SourceSiteID=3005&)  5 Standards Assessed  Hide Standards   * HSA-CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. * HSA-REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. * HSA-REI.D.11. 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. * HSA-REI.D.12. 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. * HSG-GPE.B.5. 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). | |  | Quick Writes  Pre Assessment: Written: Quick Write  Three examples of quick writes that can be used to check student prior knowledge.  [pre-assmt quick writes.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50400&SourceSiteID=3005&)  3 Standards Assessed  Hide Standards   * HSA-REI.C.5. 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. * HSA-REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. * HSA-REI.D.11. 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. | |  | T-Shirts Galore  Summative: Performance: Authentic Task  [T-shirtsGaloreChallenge.pdf](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50401&SourceSiteID=3005&) [T-ShirtsGaloreKEY2.pdf](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50402&SourceSiteID=3005&)  2 Standards Assessed  Hide Standards   * HSA-CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. * HSA-REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. | |  | Digital Modeling Demo  Formative: Project: Product Based  [Math 1 Systems Project.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50403&SourceSiteID=3005&)  No Standards Assessed |   4 record(s) found. | |
| |  | | --- | | Integration Opportunities (Optional) |   Choose Standards   |  |  |  | | --- | --- | --- | | P21: 21st Century Student Outcomes | | | | **P21: K-12** | | | | Core Subjects & 21st Century Themes | | | | **Global Awareness** | | | |  | Using 21st century skills to understand and address global issues |  | | **Civic Literacy** | | | |  | Understanding the local and global implications of civic decisions |  | | Learning & Innovation Skills | | | | **Use Systems Thinking**  **Show details**  **Use Systems Thinking**  **Hide details**  **Learning and innovation skills increasingly are being recognized as those that separate students who are prepared for a more and more complex life and work environments in the 21st century, and those who are not. A focus on creativity, critical thinking, communication and collaboration is essential to prepare students for the future.** | | | |  | Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems |  | | **Make Judgements and Decisions**  **Show details**  **Make Judgements and Decisions**  **Hide details**  **Learning and innovation skills increasingly are being recognized as those that separate students who are prepared for a more and more complex life and work environments in the 21st century, and those who are not. A focus on creativity, critical thinking, communication and collaboration is essential to prepare students for the future.** | | | |  | Interpret information and draw conclusions based on the best analysis |  | | **Solve Problems**  **Show details**  **Solve Problems**  **Hide details**  **Learning and innovation skills increasingly are being recognized as those that separate students who are prepared for a more and more complex life and work environments in the 21st century, and those who are not. A focus on creativity, critical thinking, communication and collaboration is essential to prepare students for the future.** | | | |  | Solve different kinds of non-familiar problems in both conventional and innovative ways |  | | **Collaborate with Others**  **Show details**  **Collaborate with Others**  **Hide details**  **Learning and innovation skills increasingly are being recognized as those that separate students who are prepared for a more and more complex life and work environments in the 21st century, and those who are not. A focus on creativity, critical thinking, communication and collaboration is essential to prepare students for the future.** | | | |  | Assume shared responsibility for collaborative work, and value the individual contributions made by each team member |  | | Life & Career Skills | | | | **Initiative and Self-Direction Manage Goals and Time**  **Show details**  **Initiative and Self-Direction Manage Goals and Time**  **Hide details**  **Today’s life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to developing adequate life and career skills.** | | | |  | Set goals with tangible and intangible success criteria |  | |  | Utilize time and manage workload efficiently |  | | **Productivity and Accountability Manage Projects**  **Show details**  **Productivity and Accountability Manage Projects**  **Hide details**  **Today’s life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to developing adequate life and career skills.** | | | |  | Prioritize, plan and manage work to achieve the intended result |  | | |  | | --- | | Additional Integration Opportunities (Optional) |   **READING:**  Students will use critical reading strategies listed in processes when analyzing prompts such as T-Shirts Galore, Coffee Chart, School Dance as well as in problem solving & test prompts.  **WRITING**:  Students will use mathematically precise vocab to create written arguments and explanations in tasks such as Quick Write and in the Digital Modeling Project.  **SPEAKING & LISTENING**:  Students will critique reasoning of others & share their own reasoning using mathematically precise vocabulary, appropriate expressions of agreement/disagreement. Tasks that lend to class discussion include: Defining Regions, Identifying Solutions, Parallel & Perpendicular Slope Investigation, and Put It Together.  **TECHNOLOGY:**  Students will use digital tools to investigate parallel & perpendicular lines with Desmos website and to create work product for the Digital Modeling Project. |
| |  | | --- | | Character Qualities (Optional) |  |  |  | | --- | --- | | * Self-discipline * Responsibility * Integrity * Cooperation * Citizenship | Citizenship could be added to the character qualities that were developed in the first grading period. The units on **systems**, stats, and exponential patterns lend themselves to applications that can foster classroom, community, national & global issues. Additionally, if it hasn't yet occurred, this would be a good time to begin including students in daily classroom functions (material distribution, self & peer assessment, creating rubrics for assmt, etc.) | | |  | | --- | | Differentiation/Intervention Focus Areas (Optional |   The UNIT Graphic Organizer helps make the connections between concepts & topics clear to the students.  One way to differentiate in a math class is by designing & presenting questions to the students so that they proceed from lower to higher levels of cognitive demand. For example: Start by asking direct knowledge based questions progressing to questions about characteristics, similarities & differences and concluding with generalizations & predictions. See the Differentiated Questioning attachment below.  [SYSTEMS UNIT GRAPHIC ORGANIZER.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50414&) [DIFFERENTIATED QUESTIONING.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50415&) |

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