**Math Appendix E: Technology Standards**

**Grades 6-8**

The Lindenwold Public Schools believe that technology is most effective when it is part of the learning experience throughout all courses and grades, wherever possible and appropriate. Our teachers aim to help students consider how to select, use, and recommend technologies to accomplish specific objectives and goals related to the curriculum. Our status as a Google Apps school gives all stakeholders regular and consistent opportunities to use Google tools as part of our instruction, assessment, collaboration, and documentation practices.

| **Standard** | 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge | | |
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| **Strand** | A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations | | |
| **Grade Level bands** | **Content Statement Students will:** | **Indicator** | **Indicator** |
| **6-8** | Understand and use technology systems. | 8.1.8.A.1 | Demonstrate knowledge of a real world problem using digital tools |
| Select and use applications effectively | 8.1.8.A.2 | Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability |
| 8.1.8.A.3 | Use and/or develop a simulation that provides an environment to solve a real world problem or theory. |
| 8.1.8.A.4 | Graph and calculate data within a spreadsheet and present a summary of the results |
| 8.1.8.A.5 | Create a database query, sort and create a report and describe the process, and explain the report results |
| **Key activities:**   * Introduction to and use of computers/Chromebooks * Introduction to and use of Google suite of tools including Search, Docs, Sheets, Forms, Sites, Maps, YouTube, and Photos * Use Google suite of tools to map and communicate math application projects | | | |

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| **Strand** | B. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology. | | |
| **Grade Level bands** | **Content Statement Students will:** | **Indicator** | **Indicator** |
| **6-8** | Apply existing knowledge to generate new ideas, products, or processes.  Create original works as a means of personal or group expression. | 8.1.8.B.1 | Synthesize and publish information about a local or global issue or event (ex. telecollaborative project, blog, school web). |
| **Key Activities:**   * Students use Google suite of tools to engage in collaborative creation using photos, words, artistic expressions, etc. as well as math application projects | | | |

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| **Strand** | C. Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. | | |
| **Grade Level bands** | **Content Statement Students will:** | **Indicator** | **Indicator** |
| **6-8** | Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.  Communicate information and ideas to multiple audiences using a variety of media and formats.  Develop cultural understanding and global awareness by engaging with learners of other cultures.  Contribute to project teams to produce original works or solve problems. | 8.1.8.C.1 | Collaborate to develop and publish work that provides perspectives on a global problem for discussions with learners from other countries. |
| **Key Activities:**   * Use Skype to partner with classrooms abroad and engage in discussion * Use collaborative and/or competitive interactive digital games for learning * Use Twitter to follow global trends and learn about other cultures and related math events around the world | | | |

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| **Strand** | D. Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. | | |
| **Grade Level bands** | **Content Statement Students will:** | **Indicator** | **Indicator** |
| **6-8** | Advocate and practice safe, legal, and responsible use of information and technology. | 8.1.8.D.1 | Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media |
| Demonstrate personal responsibility for lifelong learning. | 8.1.8.D.2 | Demonstrate the application of appropriate citations to digital content. |
| 8.1.8.D.3 | Demonstrate an understanding of fair use and Creative Commons to intellectual property. |
| Exhibit leadership for digital citizenship. | 8.1.8.D.4 | Assess the credibility and accuracy of digital content. |
| 8.1.8.D.5 | Understand appropriate uses for social media and the negative consequences of misuse |
| **Key Activities:**   * Introduction to the appropriate use of collaborative online environments such as Google Classroom and Edmodo * Ideas for using collaborative online environments for math application projects | | | |

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| **Strand** | Strand E: Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information. | | |
| **Grade Level bands** | **Content Statement Students will:** | **Indicator** | **Indicator** |
| **6-8** | Plan strategies to guide inquiry  Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.  Evaluate and select information sources and digital tools based on the appropriateness for specific tasks. | 8.1.8.E.1 | Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem |
| **Key Activities:**   * Students use Google suite of tools to engage in research and collaborative and independent problem exploration | | | |

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| **Strand** | F: Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. | | |
| **Grade Level bands** | **Content Statement Students will:** | **Indicator** | **Indicator** |
| **6-8** | Identify and define authentic problems  and significant questions for investigation.  Plan and manage activities to develop a solution or complete a project.  Collect and analyze data to identify solutions and/or make informed decisions.  Use multiple processes and diverse perspectives to explore alternative solutions. | 8.1.8.F.1 | Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision. |
| **Key Activities**   * Students use Google suite of tools to guide thinking about problems and how to solve them * Lessons on the scientific process and use of digital tools to facilitate the collection, organization, analysis, and sharing of data and findings | | | |

| **Standard** | 8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment. | | |
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| **Strand** | A. The Nature of Technology: Creativity and Innovation Technology systems impact every aspect of the world in which we live. | | |
| **Grade Level bands** | **Content Statement Students will:** | **Indicator** | **Indicator** |
| **6-8** | The characteristics and scope of technology | 8.2.8.A.1 | Research a product that was designed for a specific demand and identify how the  product has changed to meet new demands (i.e. telephone for communication - smart  phone for mobility needs). |
| The core concepts of  technology. | 8.2.8.A.2 | Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system. |
| 8.2.8.A.3 | Redesign an existing product that impacts the environment to lessen its impact(s) on the environment. |
| The relationships among technologies and the connections between technology and other fields of study. | 8.2.8.A.4 | Redesign an existing product that impacts the environment to lessen its impact(s) on the environment |
| 8.2.8.A.5 | Describe how resources such as material, energy, information, time, tools, people, and  capital contribute to a technological product or system. |
| **Key Activities**   * Manipulatives in math lessons provide opportunity to design, plan, develop, and use objects for a purpose (understanding abstract math) * Understanding of math principles connected to local community and design of key features like parks, roads, etc. | | | |

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| **Strand** | B. Technology and Society: Knowledge and understanding of human, cultural and societal values are fundamental when designing technological systems and products in the global society. | | |
| **Grade Level bands** | **Content Statement Students will:** | **Indicator** | **Indicator** |
| **6-8** | The cultural, social, economic and political effects of technology. | 8.2.8.B.1 | Evaluate the history and impact of sustainability on the development of a designed  product or system over time and present results to peers. |
| 8.2.8.B.2 | Identify the desired and undesired consequences from the use of a product or system |
| The effects of technology on the environment. | 8.2.8.B.3 | Research and analyze the ethical issues of a product or system on the environment and report findings for review by peers and /or experts |
| 8.2.8.B.4 | Research examples of how humans can devise technologies to reduce the negative  consequences of other technologies and present your findings. |
| The role of society in the development and use of technology. | 8.2.8.B.5 | Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries and societies |
| 8.2.8.B.6 | Compare and contrast the different types of intellectual property including copyrights, patents and trademarks |
| The influence of technology  on history. | 8.2.8.B.7 | Compare and discuss how technologies have influenced history in the past century. |
| Key Activities:   * Considerations of limitations of technology in its use to achieve curricular aims (e.g., pros and cons of print materials vs. digital materials) | | | |

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| **Strand** | C. Design: The design process is a systematic approach to solving problems. | | |
| **Grade Level bands** | **Content Statement Students will:** | **Indicator** | **Indicator** |
| **6-8** | The attributes of design. | 8.2.8.C.1 | Explain how different teams/groups can contribute to the overall design of a product. |
| 8.2.8.C.2 | Explain the need for optimization in a design process. |
| 8.2.8.C.3 | Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer. |
| The application of  engineering design. | 8.2.8.C.4 | Identify the steps in the design process that would be used to solve a designated problem. |
| 8.2.8.C.5 | Explain the interdependence of a subsystem that operates as part of a system |
| 8.2.8.C.5a | Create a technical sketch of a product with materials and measurements labeled. |
| The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving. | 8.2.8.C.6 | Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution |
| 8.2.8.C.7 | Collaborate with peers and experts in the field to research and develop a product using the design process, data analysis and trends, and maintain a design log with annotated sketches to record the developmental cycle |
| 8.2.8.C.8 | Develop a proposal for a chosen solution that include models (physical, graphical or  mathematical) to communicate the solution to peers. |
| **Key Activities**   * Use Google suite of tools to collaborate and build solutions for problems posed within curricula * Use of problem-solving technological tools in math application efforts * Discussion on physical limitations of technological equipment * Discovery of forums to communicate about math application with others on a global scale | | | |

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| **Strand** | D. Abilities for a Technological World: The designed world is the product of a design process that provides the means to convert resources into products and systems. | | |
| **Grade Level bands** | **Content Statement Students will:** | **Indicator** | **Indicator** |
| **6-8** | Apply the design process. | 8.2.8.D.1 | Design and create a product that addresses a real world problem using a design process under specific constraints. |
| 8.2.8.D.2 | Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook. |
| 8.2.8.D.3 | Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution |
| Use and maintain  technological products and systems. | 8.2.8.D.4 | Research and publish the steps for using and maintaining a product or system and incorporate diagrams or images throughout to enhance user comprehension. |
| Assess the impact of products and systems. | 8.2.8.D.5 | Explain the impact of resource selection and the production process in the development of a common or technological product or system. |
| 8.2.8.D.6 | Identify and explain how the resources and processes used in the production of a current technological product can be modified to have a more positive impact on the environment. |
| Key Activities:   * Discussion on physical limitations of technological equipment | | | |

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| **Strand** | E. Computational Thinking: Programming: Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge. | | |
| **Grade Level bands** | **Content Statement Students will:** | **Indicator** | **Indicator** |
| **6-8** | Computational thinking and computer programming as tools used in design and engineering. | 8.2.8.E.1 | Identify ways computers are used that have had an impact across the range of human activity and within different careers where they are used |
| 8.2.8.E.2 | Demonstrate an understanding of the relationship between hardware and software |
| 8.2.8.E.3 | Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution |
| 8.2.8.E.4 | Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms). |
| **Key Activities**   * Lessons on math processes and building familiarity with equations (algorithms) * Lessons on vocabulary for technical conversation * Protocols for guiding student self-directedness with classroom procedures and academic critical thinking * Non-fiction texts on role of computers and technology in society | | | |