## West Deptford Middle School Curriculum Map
### Digital Design - Grade 8

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| Unit 1: Intro to Tinkercad | • How can a 3D Printer be used to create an entire project or a part to fit in an existing project?  
• How do I select which 3D design software application is best to design my project? | • Students will be guided through the 3D design process via easy hands-on "Lessons", that teach you the basics of Tinkercad before moving on to more complex modeling techniques. | • Getting Started-Navigation and Menus  
• Testing your New Navigation Skills  
• Moving, Rotating, and Scaling Objects  
• Making and Manipulating Grouped Objects  
• Using the Align Tools and the Workplane Helper | • "Let’s Learn Tinkercad" project  
• Class Participation  
• Classwork (completion of individual lessons within project)  
• Projects/Design Challenges | • MA.5.CCSS.Math.Content.5.MD.A.1  
• MA.5.CCSS.Math.Content.5.G.A.1  
• MA.5.CCSS.Math.Content.5.G.B.3 |
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| Unit 2: Steamship Boat Approx. 2-3 Sessions | • How can a 3D Printer be used to create an entire project or a part to fit in an existing project?  
• How do I select which 3D design software application is best to design my project? | • Students will be creating a steamship boat using primitive shapes and features within Tinkercad program | • Grouping shapes to form new objects  
• Creating holes or negative space within objects  
• Scaling shapes or objects  
• Moving and Rotating objects | • “Steamboat Ship” project  
• Class Participation  
• Classwork (completion of individual lessons within projects)  
• Projects/Design Challenges | • MA.5.CCSS.Math.Content.5.MD.A.1  
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| Unit 3: 3D Print your own Buttons | • How can a 3D Printer be used to create an entire project or a part to fit in an existing project?  
• How do I select which 3D design software application is best to design my project?  
• How can we use a 3D printer to create fasteners for clothing? | • In this introductory Project Based Learning activity students will be guided through a series of projects that show them how to create buttons for their clothing with the end goal of 3D printing them.  
• Students will have to implement the basics of TinkerCAD.  
• Students will learn how to design a product with a set of design requirements. | • How to design models for 3D printing (i.e. creating flat side, overhang consideration)  
• How to create basic features while considering design requirements (i.e. Hole Placement for thread)  
• Reinforcement of basic tools of TinkerCAD (i.e. scaling, grouping, copy/paste, etc) | • Basic Button  
• Smiley Face Button  
• Heart Button  
• Class Participation  
• Classwork (completion of individual lessons within projects)  
• Projects/Design Challenges | • MA.5.CCSS.Math.Content.5.MD.A.1  
• MA.5.CCSS.Math.Content.5.G.A.1  
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| Unit 3: 3D Print your own Ring | • How can a 3D Printer be used to create an entire project or a part to fit in an existing project?  
• How do I select which 3D design software application is best to design my project?  
• How can we use a 3D printer to create jewelry? | • In this introductory Project Based Learning activity students will be guided through a series of projects that show them how to create rings with the end goal of 3D printing them.  
• Students will have to implement the basics of TinkerCAD. Additionally, students will have to investigate and consider their findings in order to design rings that fit. | • How to design models for 3D printing (i.e. creating flat side, overhang consideration)  
• How to create basic features while considering design requirements  
• Reinforcement of basic tools of TinkerCAD (i.e. scaling, grouping, copy/paste, etc) | • Basic Ring  
• Heart Ring  
• Diamond Ring  
• Class Participation  
• Classwork (completion of individual lessons within projects)  
• Projects/Design Challenges | • MA.5.CCSS.Math.Content.5.MD.A.1  
• MA.5.CCSS.Math.Content.5.G.A.1  
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| Unit 4: Sugar Rush: Custom Candy Mold Approx. 1-2 Sessions | • How can a 3D Printer be used to create an entire project or a part to fit in an existing project?  
• How do I select which 3D design software application is best to design my project?  
• How can we use a 3D printer to create a custom candy mold? | • In this introductory Project Based Learning activity students will be guided through a series of steps that show them how to create a custom candy mold with the end goal of 3D printing them.  
• Students will have to implement the basics of TinkerCAD. | • Grouping shapes  
• Creating negative space (holes)  
• Scaling objects  
• Aligning objects  
• Use the “mirror” function | • Candy Mold  
• Class Participation  
• Classwork (completion of individual lessons within projects)  
• Projects/Design Challenges | • MA.5.CCSS.Math.Content.5.MD.A.1  
• MA.5.CCSS.Math.Content.5.G.A.1  
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| Unit 5: Minecraft Bobbleheads  
Approx. 2-3 Sessions | • How can a 3D Printer be used to create an entire project or a part to fit in an existing project?  
• How do I select which 3D design software application is best to design my project?? | • Students will be creating their favorite Minecraft Bobblehead figure from scratch using primitive shapes within the Tinkercad program. | • How to research a topic  
• How to use Tinkercad basic commands  
• Grouping Shapes  
• Transfer Shapes from right menu to the workspace  
• Insert Holes  
• Measure and transfer measurements to Work plane  
• Download .stl files | • Minecraft Bobblehead  
• Class Participation  
• Classwork (completion of individual lessons within projects)  
• Projects/Design Challenges | • MA.5.CCSS.Math.Content.5.MD.A.1  
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| Unit 6: Explore Buoyancy: Design Sea Craft | • How can a 3D Printer be used to create an entire project or a part to fit in an existing project?  
• How do I select which 3D design software application is best to design my project?  
• How can we use a 3D printer to create boats that can carry weight? | • In this Project Based Learning activity, students will be guided through a series of lessons that show them how to create functional boat that can be 3D printed easily.  
• Students will have to implement the basics of Tinkercad. Additionally, students will learn about density through an additional hands-on investigation. | • How to design models for 3D printing (i.e. creating flat side, overhang consideration)  
• Reinforcement of basic tools of Tinkercad (i.e. scaling, grouping, copy/paste, etc)  
• Students will be able to conduct a small investigation about density.  
• Students will develop a deeper understand of density through this investigation. | • Start with a Simple Raft  
• Haul with a Boat  
• Make it your Own  
• Class Participation  
• Classwork (completion of individual lessons within projects)  
• Projects/Design Challenges | • MA.5.CCSS.Math.Content.5.MD.A.1  
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<td>Unit 7: Building</td>
<td>- How can a 3D Printer be used to create an entire project or a part to fit in an</td>
<td>In this project, students will learn about 3D design and 3D printing by</td>
<td>- Creating, scaling, and positioning objects</td>
<td>- Create your Word Block</td>
<td>- MA.5.CCSS.Math.Content.5.MD.A.1</td>
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<tr>
<td>Word Blocks</td>
<td>existing project?</td>
<td>creating their own Word Block. Each student can create their own block</td>
<td>- Aligning and grouping objects</td>
<td>- Create your Word Block</td>
<td>- MA.5.CCSS.Math.Content.5.G.A.1</td>
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<tr>
<td>Approx. 4-5</td>
<td>- How do I select which 3D design software application is best to design my project?</td>
<td>with a word of their choice. After the Word Blocks are printed, students</td>
<td>- Grouping objects to create holes</td>
<td>- Class Participation</td>
<td>- MA.5.CCSS.Math.Content.5.G.B.3</td>
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<td>Sessions</td>
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<td>can snap their words together to create fun phrases and messages.</td>
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<td>- Classwork</td>
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<td>(completion of individual lessons within projects)</td>
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| Unit 8: How to Create a Ringed Planet Approx. 4-5 Sessions | • How can a 3D Printer be used to create an entire project or a part to fit in an existing project?  
• How do I select which 3D design software application is best to design my project? | • In this project, students will create a small scale version of a planet with rings surrounding it. | • Scaling Objects  
• Aligning and grouping objects | • Creating the Planet  
• Creating the Rings  
• Aligning the Rings to the Planet  
• Class Participation  
• Classwork (completion of individual lessons within projects)  
• Projects/Design Challenges | • MA.5.CCSS.Math.Content.5.MD.A.1  
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| Unit 9: Build a Tinkercad House Approx. 7-8 Sessions | • How can a 3D Printer be used to create an entire project or a part to fit in an existing project?  
• How do I select which 3D design software application is best to design my project?  
• How can we use a 3D printer to build a small scale replica of a house? | • In this activity you will follow along with the steps to create a simple house shape. After completing this activity, you will be let loose to create your own unique design or personalize your house further on your own.  
• Begin to learn the basics of how Architects design a house by creating a simple floor plan from the house you create. | • Scaling Objects  
• Aligning and grouping objects  
• How to take a simple slice from the house they create to see a basic floor plan of their design. | • Creating the Walls of the House  
• Create the Arched Doorway  
• Add a Roof to the House  
• Create a Floor Plan of your House  
• Make it your Own  
• Class Participation  
• Classwork (completion of individual lessons within projects)  
• Projects/Design Challenges | • MA.5.CCSS.Math.Content.5.MD.A.1  
• MA.5.CCSS.Math.Content.5.G.A.1  
• MA.5.CCSS.Math.Content.5.G.B.3 |
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| Unit 10: Making Everyday Objects (Part One) Approx. 7-8 Sessions | - How can a 3D Printer be used to create an entire project or a part to fit in an existing project?  
- How do I select which 3D design software application is best to design my project? | The project starts with a very basic lesson (creating a button) that introduces students how to create objects, cut holes and group. The lesson begins to add levels of freedom by allowing you to customize objects, create a stamp with a pattern of your own design and finally solve an open-ended challenge problems. When finished, you will be ready to move on to Intermediate Tinkercad lessons or continue to enjoy more beginner lessons and really hone your Tinkercad skills. | Upon completion of these lessons, students who have demonstrated mastery will be able to:  
- Create objects using shape primitives, letters and imported STL files  
- Move, scale and rotate objects using handles  
- Scale objects using the ruler  
- Pan the camera in, out and around the model  
- Group objects to make holes  
- Plan how to create simple objects  
- Modify existing objects to their own  
- Simple Button  
- Make a Trick Die  
- Custom Stamp  
- Backpack Zipper Pull  
- Build a Spork for Outer Space  
- Class Participation  
- Classwork (completion of individual lessons within projects)  
- Projects/Design Challenges | - CCSS.MATH.CONTENT.6.SP.B.5.A  
- CCSS.MATH.CONTENT.6.SP.B.5.A  
- CCSS.MATH.CONTENT.6.SP.B.4  
- CCSS.MATH.CONTENT.6.SP.B.4 |
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<tr>
<td>● Understand the design constraints involved in using a 3-D printer</td>
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<td>● Import a two-dimensional file to make a custom design</td>
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| Unit 11: Build a Better Puck Challenge | - How can a 3D Printer be used to create an entire project or a part to fit in an existing project?  
- How do I select which 3D design software application is best to design my project? | - These easy, step-by-step Tinkercad lessons will guide you through the process of designing your own awesome hockey puck; designs that push performance and style to the limits!  
- This lesson has two objectives: Use the scientific process to increase the performance of the regulation hockey puck. Take artistic license of your design by adding graphics to your puck. | - Copying/Pasting  
- Move, Scale, Rotate objects  
- Group primitive shapes to create new objects  
- Use vector art to add graphic designs to an object | - Getting Started: Simple Experiments  
- Filleting: Taking the Edge Off  
- Reducing Friction  
- Personalizing Your Puck | - CCSS.MATH.CONTENT.6.SP.B.5.A  
- CCSS.MATH.CONTENT.6.SP.B.4 |
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| Unit 12: How to Create an Alien | • How can a 3D Printer be used to create an entire project or a part to fit in an existing project?  
• How do I select which 3D design software application is best to design my project? | • Students will use the guided step-by-step Tinkercad lessons in the Project Ignite project to create an alien figure.  
• Their figure will include features such as a mouth, eyes, arms, and a back shell. | • Scaling shapes and objects  
• Rotating Objects  
• Grouping Objects  
• Changing the profile of objects using the Inspector window  
• Aligning Objects | • Creating the Body  
• Adding the Arms  
• Adding Details  
• Class Participation  
• Classwork (completion of individual lessons within projects)  
• Projects/Design Challenges | • MA.5.CCSS.Math.Content.5.MD.A.1  
• MA.5.CCSS.Math.Content.5.G.A.1  
• MA.5.CCSS.Math.Content.5.G.B.3 |