Level 1 3D (1-3) Standards

Level 1 CCSS Mathematics Alignment for 3D	
Mathematical Practices	**Application in Curriculum**
MP.1 Make sense of problems and persevere in solving them.	The coursework is centered around project-based learning with ample opportunities for discovery and problem-solving. Successful prints are only possible through a process of trial and error fueled by perseverance.
MP.5 Use appropriate tools strategically.	Students must choose from a variety of tools in the 3D modeling software to successfully create their projects.
MP.6 Attend to precision.	3D models must be created with great attention to detail in order to be viable for 3D printing.
MP.8 Look for and express regularity in repeated reasoning.	Designing in 3D environment requires attention to patterns in both visual, aesthetic design and object manipulation.
Measurement and Data	
1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.	Students sort objects via a number of criteria including height, length, and color.
1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.	Design of the objects is performed on a grid with demarcations of unit squares. Dimensional manipulation of the objects is performed both in reference to these unit squares and their corresponding real world dimensional equivalent.
2.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.	Strict measurement constraints are given in order for the students' creations to be printed. Various objects are measured both physically and digitally.
3.MD.5 Recognize area as an attribute of plane figures and understand concepts of area measurement.	Area and volumetric measurements are taken into account when creating the 3D objects.
Geometry	
1.G.1 Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.	The 3D workplane enables students to easily manipulate non-defining attributes of shapes and recognize their difference from defining attributes as the must choose the correct shapes to construct their designs.

2.G.1 Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.	Students recognize and utilize a variety of two-dimensional and three-dimensional figures in the creation of their projects.

Level 1 CCSS English Language Arts Alignment for 3D	
Reading Informational Text	**Application in Curriculum**
RI.1.6 Distinguish between information provided by pictures or other illustrations and information provided by the words in a text.	Reference Material Handbooks provide guidance for students in the design process and contain both text and images.
RI.1.7 Use the illustrations and details in a text to describe its key ideas.	Students interpret the information in their Reference Material Handbooks and identify the main ideas located inside.
Writing	
W.2.8 Recall information from experiences or gather information from provided sources to answer a question.	Personal experience and written instructions are used to conceptualize the students' designs.
W.2.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	Reflection questions provide students with the opportunity to write about their experiences on a weekly basis.
Speaking and Listening	
SL.3.1d Explain their own ideas and understanding in light of the discussion.	During the Gallery Walk, students present their creations to friends and family, discussing both the conception and actualization processes for their designs.
SL.3.3 Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.	Students respond to questions from the instructor about their work during the Gallery Walk.
SL.3.6 Speak in complete sentences when appropriate to task and situation in order to provide requested detail or clarification.	Presentation of their printed designs is done in an eloquent and proper fashion.

Level 1 CCSS Visual Arts Alignment for 3D

1.0 ARTISTIC PERCEPTION Processing, Analyzing, and Responding to Sensory Information Through the Language and Skills Unique to the Visual Arts	Application in Curriculum
3.AP1.5 Identify and describe elements of art in works of art, emphasizing line, color, shape/ form, texture, space, and value.	Students utilize and identify a variety of artistic elements in their work.
2.0 CREATIVE EXPRESSION Creating, Performing, and Participating in the Visual Arts	
1.CE2.5 Create a representational sculpture based on people, animals, or buildings.	Designs are based off both real-world and fictional concepts including animals and buildings.
1.CE2.8 Create artwork based on observations of actual objects and everyday scenes.	Students model certain pieces based on their own memories and observations.
2.CE2.3 Depict the illusion of depth (space) in a work of art, using overlapping shapes, relative size, and placement within the picture.	The 3D work environment is all contained on a 2-dimensional screen, thus necessitating the use of illusory depth in all of the students' projects.
2.CE2.5 Use bilateral or radial symmetry to create visual balance.	Students create models that are symmetrical with respect to a number of different axes of symmetry.
4.0 AESTHETIC VALUING Responding to, Analyzing, and Making Judgments About Works in the Visual Arts	
1.AV4.1 Discuss works of art created in the classroom, focusing on selected elements of art (e.g., shape/form, texture, line, color).	Students discuss elements of their own projects as well as those of their peers.
1.AV4.4 Select something they like about their work of art and something they would change.	Reflection questions allow students to critically examine their own works.

Level 1: Technology Skills Alignment for 3D

Category		CCSS Alignment	Skills	Application in Curriculum
Demonstrate proficiency in the use of computers and applications as well as an understanding of the concepts underlying hardware, software and connectivity.	Basic Operations	SBAC test taking skills	Use pointing device such as a mouse to manipulate shape, icons; click on urls, radio buttons, check boxes; use scroll bar	Students utilize a variety of mouse functions in order to manipulate both camera functionality and object placement. Students also use the mouse to navigate menus and choose projects for editing.
		ELA : W 6	Keyboarding Locate and use letter and numbers keys with left and right-hand placement. Locate and use correct finger, hand for space bar, return/enter and shift key	A variety of keyboard shortcuts are implemented in 3D design, making an intimate knowledge of the keyboard layout imperative to students' success.
Demonstrate the responsible use of technology and an understanding of ethics and safety issues in using electronic media at home, in school and in society.	Acceptable Use, Copyright and Plagiarism	Digital Citizenship	Explain and demonstrate compliance with classroom, school rules (Acceptable Use Policy) regarding responsible use of computers and networks	Strict guidelines for proper computer use are implemented. Students are limited to school-appropriate projects in their designs.