3DuxDesign - Fun With Friction Standard Alignment

X = Core Project Standards   **X = Optional Extension Standards**

	Fun With Friction: Next Generation Science Standards Grade 3	
	Forces and Interactions	
3-PS2-1	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object	X
3-PS2-2	Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.	X
3-PS2-3	Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.	
3-PS2-4	Define a simple design problem that can be solved by applying scientific ideas about magnets.	
	Interdependent Relationships in Ecosystems	
3-LS2-1	Construct an argument that some animals form groups that help members survive.	
3-LS4-1	Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.	
3-LS4-3	Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all	
3-LS4-4	Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change	
	Inheritance and Variation of Traits: Life Cycles and Traits	
3-LS1-1	Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.	
3-LS3-1	Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.	
3-LS3-2	Use evidence to support the explanation that traits can be influenced by enviornment.	
3-LS4-2	Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.	
	Weather and Climate	
3-ESS2-1	Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.	
3-ESS2-2	Obtain and combine information to describe climates in different regions of the world.	
3-ESS3-1	Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.	
	3-5 Engineering Design	
3-5-ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	X
3-5-ETS1-2	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	X
3-5-ETS1-3	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	X

	Fun With Friction: Common Core Standards Grade 3	
	Reading: Informational Text	
RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers	X
RI.3.2	Determine the main idea of a text; recount the key details and explain how they support the main idea.	
RI.3.3	Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.	X
RI.3.4	Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area.	
RI.3.5	Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently.	
RI.3.6	Distinguish their own point of view from that of the author of a text.	
RI.3.7	Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).	X
RI.3.8	Describe the logical connection between particular sentences and paragraphs in a text (e.g., comparison, cause/effect, first/second/third in a sequence).	
RI.3.9	Compare and contrast the most important points and key details presented in two texts on the same topic.	
RI.3.10	By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 2–3 text complexity band independently and proficiently.	
	Reading: Literature	
RL.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.	
RL.3.2	Recount stories, including fables, folktales, and myths from diverse cultures; determine the central message, lesson, or moral and explain how it is conveyed through key details in the text.	
RL.3.3	Describe characters in a story (e.g., their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events.	
RL.3.4	Determine the meaning of words and phrases as they are used in a text, distinguishing literal from nonliteral language.	

RL.3.5	Refer to parts of stories, dramas, and poems when writing or speaking about a text, using terms such as chapter, scene, and stanza; describe how each successive part builds on earlier sections.	
RL.3.6	Distinguish their own point of view from that of the narrator or those of the characters.	
RL.3.7	Explain how specific aspects of a text's illustrations contribute to what is conveyed by the words in a story (e.g., create mood, emphasize aspects of a character or setting).	
RL.3.8	(Not applicable to literature)	
RL.3.9	Compare and contrast the themes, settings, and plots of stories written by the same author about the same or similar characters (e.g., in books from a series).	
RL.3.10	By the end of the year, read and comprehend literature, including stories, dramas, and poetry, at the high end of the grades 2–3 text complexity band independently and proficiently.	
Reading: Foundational Skills		
RF.3.3	Know and apply grade-level phonics and word analysis skills in decoding words.	
RF.3.3a	Identify and know the meaning of the most common prefixes and derivational suffixes.	
RF.3.3b	Decode words with common Latin suffixes.	
RF.3.3c	Decode multisyllable words.	
RF.3.3d	Read grade-appropriate irregularly spelled words.	
RF.3.4	Read with sufficient accuracy and fluency to support comprehension.	
RF.3.4a	Read grade-level text with purpose and understanding.	
RF.3.4b	Read grade-level prose and poetry orally with accuracy, appropriate rate, and expression.	
RF.3.4c	Use context to confirm or self-correct word recognition and understanding, rereading as necessary.	
Writing		
W.3.1	Write opinion pieces on topics or texts, supporting a point of view with reasons.	X
W.3.1a	Introduce the topic or text they are writing about, state an opinion, and create an organizational structure that lists reasons.	X
W.3.1b	Provide reasons that support the opinion.	X
W.3.1c	Use linking words and phrases (e.g., because, therefore, since, for example) to connect opinion and reasons.	X
W.3.1d	Provide a concluding statement or section.	X
W.3.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.	X
W.3.2a	Introduce a topic and group related information together; include illustrations when useful to aiding comprehension.	X
W.3.2b	Develop the topic with facts, definitions, and details.	X
W.3.2c	Use linking words and phrases (e.g., also, another, and, more, but) to connect ideas within categories of information.	X
W.3.2d	Provide a concluding statement or section.	X
W.3.3	Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.	
W.3.3a	Establish a situation and introduce a narrator and/or characters; organize an event sequence that unfolds naturally.	
W.3.3b	Use dialogue and descriptions of actions, thoughts, and feelings to develop experiences and events or show the response of characters to situations.	
W.3.3c	Use temporal words and phrases to signal event order.	
W.3.3d	Provide a sense of closure.	
W.3.4	With guidance and support from adults, produce writing in which the development and organization are appropriate to task and purpose. (Grade-specific expectations for writing types are defined in standards 1–3 above.)	
W.3.5	With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.	
W.3.6	With guidance and support from adults, use technology to produce and publish writing (using keyboarding skills) as well as to interact and collaborate with others.	
W.3.7	Conduct short research projects that build knowledge about a topic.	X
W.3.8	Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.	X
W.3.9	(Begins in Grade 4)	
W.3.10	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.	
Speaking and Listening		
SL.3.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.	X
SL.3.1a	Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.	X
SL.3.1b	Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).	X
SL.3.1c	Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others.	X
SL.3.1d	Explain their own ideas and understanding in light of the discussion.	X
SL.3.2	Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.	X
SL.3.3	Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.	X

SL.3.4	Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.	X
SL.3.5	Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details.	X
SL.3.6	Speak in complete sentences when appropriate to task and situation in order to provide requested detail or clarification.	
	Language	
L.3.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.	X
L.3.1a	Explain the function of nouns, pronouns, verbs, adjectives, and adverbs in general and their functions in particular sentences.	
L.3.1b	Form and use regular and irregular plural nouns.	
L.3.1c	Use abstract nouns (e.g., childhood).	
L.3.1d	Form and use regular and irregular verbs.	
L.3.1e	Form and use the simple (e.g., I walked; I walk; I will walk) verb tenses.	
L.3.1f	Ensure subject-verb and pronoun-antecedent agreement.*	
L.3.1g	Form and use comparative and superlative adjectives and adverbs, and choose between them depending on what is to be modified.	X
L.3.1h	Use coordinating and subordinating conjunctions.	X
L.3.1i	Produce simple, compound, and complex sentences.	X
L.3.2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.	X
L.3.2a	Capitalize appropriate words in titles.	X
L.3.2b	Use commas in addresses.	X
L.3.2c	Use commas and quotation marks in dialogue.	
L.3.2d	Form and use possessives.	
L.3.2e	Use conventional spelling for high-frequency and other studied words and for adding suffixes to base words (e.g., sitting, smiled, cries, happiness).	
L.3.2f	Use spelling patterns and generalizations (e.g., word families, position-based spellings, syllable patterns, ending rules, meaningful word parts) in writing words.	
L.3.2g	Consult reference materials, including beginning dictionaries, as needed to check and correct spellings.	
L.3.3	Use knowledge of language and its conventions when writing, speaking, reading, or listening.	X
L.3.3a	Choose words and phrases for effect.*	
L.3.3b	Recognize and observe differences between the conventions of spoken and written standard English.	
L.3.4	Determine or clarify the meaning of unknown and multiple-meaning word and phrases based on grade 3 reading and content, choosing flexibly from a range of strategies.	
L.3.4a	Use sentence-level context as a clue to the meaning of a word or phrase.	
L.3.4b	Determine the meaning of the new word formed when a known affix is added to a known word (e.g., agreeable/disagreeable, comfortable/uncomfortable, care/careless, heat/preheat).	
L.3.4c	Use a known root word as a clue to the meaning of an unknown word with the same root (e.g., company, companion).	
L.3.4d	Use glossaries or beginning dictionaries, both print and digital, to determine or clarify the precise meaning of key words and phrases.	
L.3.5	Demonstrate understanding of figurative language, word relationships and nuances in word meanings.	
L.3.5a	Distinguish the literal and nonliteral meanings of words and phrases in context (e.g., take steps).	
L.3.5b	Identify real-life connections between words and their use (e.g., describe people who are friendly or helpful).	
L.3.5c	Distinguish shades of meaning among related words that describe states of mind or degrees of certainty (e.g., knew, believed, suspected, heard, wondered).	
L.3.6	Acquire and use accurately grade-appropriate conversational, general academic, and domain-specific words and phrases, including those that signal spatial and temporal relationships (e.g., After dinner that night we went looking for them).	
	Math: Operations and Algebraic Thinking Standards	
3.OA.1	Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5×7.	
3.OA.2	Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as $56 \div 8$.	
3.OA.3	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	
3.OA.4	Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations $8 \times ? = 48$, $5 = \_ \div 3$, $6 \times 6 = ?$	
3.OA.5	Apply properties of operations as strategies to multiply and divide. Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)	
3.OA.6	Understand division as an unknown-factor problem. For example, find $32 \div 8$ by finding the number that makes 32 when multiplied by 8.	
3.OA.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	

3.OA.8	Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	
3.OA.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.	
	Math: Number and Operations in Base Ten Standards	
3.NBT.1	Use place value understanding to round whole numbers to the nearest 10 or 100.	
3.NBT.2	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.	
3.NBT.3	Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.	
	Math - Number and Operations Fractions Standards	
3.NF.1	Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.	
3.NF.2	Understand a fraction as a number on the number line; represent fractions on a number line diagram.	
3.NF.2a	Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line.	
3.NF.2b	Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.	
3.NF.3	Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.	
3.NF.3a	Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.	
3.NF.3b	Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.	
3.NF.3c	Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.	
3.NF.3d	Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	
	Math - Measurement and Data	
3.MD.1	Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.	**X**
3.MD.2	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.	
3.MD.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.	
3.MD.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.	**X**
3.MD.5	Recognize area as an attribute of plane figures and understand concepts of area measurement.	**X**
3.MD.5a	A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.	
3.MD.5b	A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.	
3.MD.6	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	
3.MD.7	Relate area to the operations of multiplication and addition.	
3.MD.7a	Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.	
3.MD.7b	Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.	
3.MD.7c	Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning.	
3.MD.7d	Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.	
3.MD.8	Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	
	Math - Geometry	
3.G.1	Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	**X**
3.G.2	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.	

Fun With Friction: ISTE Grade 3	

Empowered Learner		
1.1	Students leverage technology to take an active role in choosing, achieving, and demonstrating competency in their learning goals, informed by the learning sciences.	**X**

1.1 a	Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.	X
1.1 b	Students build networks and customize their learning environments in ways that support the learning process.	X
1.1 c	Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.	
1.1 d	Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.	
	Digital Citizen	
1.2	Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical.	
1.2 a	Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.	
1.2 b	Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.	
1.2 c	Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.	
1.2 d	Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.	
	Knowledge Constructor	
1.3	Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.	
1.3 a	Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.	X
1.3 b	Students evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources.	X
1.3 c	Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.	
1.3 d	Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.	X
	Innovative Designer	
1.4	Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.	X
1.4 a	Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.	X
1.4 b	Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.	
1.4 c	Students develop, test and refine prototypes as part of a cyclical design process.	X
1.4 d	Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.	X
	Computational Thinker	
1.5	Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.	X
1.5 a	Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.	X
1.5 b	Students collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.	
1.5 c	Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.	X
1.5 d	Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.	
	Creative Communicator	
1.6	Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.	X
1.6 a	Students choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.	X
1.6 b	Students create original works or responsibly repurpose or remix digital resources into new creations.	X
1.6 c	Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.	X
1.6 d	Students publish or present content that customizes the message and medium for their intended audiences.	X
	Global Collaborator	
1.7	Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.	X
1.7 a	Students use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.	
1.7 b	Students use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.	
1.7 c	Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.	X
1.7 d	Students explore local and global issues and use collaborative technologies to work with others to investigate solutions.	X