3DuxDesign - Fun With Friction Standard Alignment

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

Fun With Friction: Next Generation Science Standards Grade 5		
Structure and Properties of Matter		
5-PS1-1	Develop a model to describe that matter is made of particles too small to be seen.	
5-PS1-2	Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.	
5-PS1-3	Make observations and measurements to identify materials based on their properties.	X
5-PS1-4	Conduct an investigation to determine whether the mixing of two or more substances results in new substances.	
Matter and Energy in Organisms and Ecosystems		
5-PS3-1	Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.	
5-LS1-1	Support an argument that plants get the materials they need for growth chiefly from air and water.	
5-LS2-1	Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.	
Earth's Systems		
5-ESS2-1	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact	
5-ESS2-2	Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	
5-ESS3-1	Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	
Space Systems: Starts and the Solar System		
5-PS2-1	Support an argument that the gravitational force exerted by Earth on objects is directed down.	
5-ESS1-1	Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.	
5-ESS1-2	Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	
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 5		
Reading: Informational Text		
RI.5.1	Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.	
RI.5.2	Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.	
RI.5.3	Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.	X
RI.5.4	Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.	
RI.5.5	Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.	
RI.5.6	Analyze multiple accounts of the same event or topic, noting important similarities and differences in the point of view they represent.	
RI.5.7	Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.	X
RI.5.8	Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).	
RI.5.9	Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.	
RI.5.10	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 4-5 text complexity band independently and proficiently.	
Reading: Literature		
RL.5.1	Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.	
RL.5.2	Determine a theme of a story, drama, or poem from details in the text, including how characters in a story or drama respond to challenges or how the speaker in a poem reflects upon a topic; summarize the text.	
RL.5.3	Compare and contrast two or more characters, settings, or events in a story or drama, drawing on specific details in the text (e.g., how characters interact).	
RL.5.4	Determine the meaning of words and phrases as they are used in a text, including figurative language such as metaphors and similes.	

RL.5.5	Explain how a series of chapters, scenes, or stanzas fits together to provide the overall structure of a particular story, drama, or poem.	
RL.5.6	Describe how a narrator's or speaker's point of view influences how events are described.	
RL5.7	Analyze how visual and multimedia elements contribute to the meaning, tone, or beauty of a text (e.g., graphic novel, multimedia presentation of fiction, folktale, myth, poem).	
RL.5.8	(RL.5.8 not applicable to literature)	
RL.5.9	Compare and contrast stories in the same genre (e.g., mysteries and adventure stories) on their approaches to similar themes and topics.	
RL.5.10	By the end of the year, read and comprehend literature, including stories, dramas, and poetry, at the high end of the grades 4-5 text complexity band independently and proficiently.	
Reading: Foundational Skills		
RF.5.3	Know and apply grade-level phonics and word analysis skills in decoding words.	
RF.5.3a	Use combined knowledge of all letter-sound correspondences, syllabication patterns, and morphology (e.g., roots and affixes) to read accurately unfamiliar multisyllabic words in context and out of context.	
RF.5.4	Read with sufficient accuracy and fluency to support comprehension.	
RF.5.4a	Read grade-level text with purpose and understanding.	
RF.5.4b	Read grade-level prose and poetry orally with accuracy, appropriate rate, and expression.	
RF.5.4c	Use context to confirm or self-correct word recognition and understanding, rereading as necessary.	
Writing		
W.5.1	Write opinion pieces on topics or texts, supporting a point of view with reasons and information.	X
W.5.1a	Introduce a topic or text clearly, state an opinion, and create an organizational structure in which ideas are logically grouped to support the writer's purpose.	X
W.5.1b	Provide logically ordered reasons that are supported by facts and details.	X
W.5.1c	Link opinion and reasons using words, phrases, and clauses (e.g., consequently, specifically).	X
W.5.1d	Provide a concluding statement or section related to the opinion presented.	X
W.5.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.	X
W.5.2a	Introduce a topic clearly, provide a general observation and focus, and group related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.	X
W.5.2b	Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.	X
W.5.2c	Link ideas within and across categories of information using words, phrases, and clauses (e.g., in contrast, especially).	
W.5.2d	Use precise language and domain-specific vocabulary to inform about or explain the topic.	
W.5.2e	Provide a concluding statement or section related to the information or explanation presented.	X
W.5.3	Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.	
W.5.3a	Orient the reader by establishing a situation and introducing a narrator and/or characters; organize an event sequence that unfolds naturally.	
W.5.3b	Use narrative techniques, such as dialogue, description, and pacing, to develop experiences and events or show the responses of characters to situations.	
W.5.3c	Use a variety of transitional words, phrases, and clauses to manage the sequence of events.	X
W.5.3d	Use concrete words and phrases and sensory details to convey experiences and events precisely.	
W.5.3e	Provide a conclusion that follows from the narrated experiences or events.	X
W.5.4	Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)	X
W.5.5	With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.	
W.5.6	With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting.	
W.5.7	Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.	X
W.5.8	Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.	
W.5.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.	
W.5.9a	Apply grade 5 Reading standards to literature (e.g., "Compare and contrast two or more characters, settings, or events in a story or a drama, drawing on specific details in the text [e.g., how characters interact]").	
W.5.9b	Apply grade 5 reading standards to informational texts (e.g., "Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point[s]").	
W.5.10	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.5.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.	X
SL.5.1a	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.5.1b	Follow agreed-upon rules for discussions and carry out assigned roles.	X
SL.5.1c	Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.	X
SL.5.1d	Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.	X
SL.5.2	Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.	X
SL.5.3	Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.	X
SL.5.4	Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.	X
SL.5.5	Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.	X
SL.5.6	Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation.	X
	Language	
L.5.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.	X
L.5.1a	Explain the function of conjunctions, prepositions, and interjections in general and their function in particular sentences.	
L.5.1b	Form and use the perfect (e.g., I had walked; I have walked; I will have walked) verb tenses.	
L.5.1c	Use verb tense to convey various times, sequences, states, and conditions.	
L.5.1d	Recognize and correct inappropriate shifts in verb tense.*	
L.5.1e	Use correlative conjunctions (e.g., either/or, neither/nor).	
L.5.2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.	X
L.5.2a	Use punctuation to separate items in a series.*	X
L.5.2b	Use a comma to separate an introductory element from the rest of the sentence.	X
L.5.2c	Use a comma to set off the words yes and no (e.g., Yes, thank you), to set off a tag question from the rest of the sentence (e.g., It's true, isn't it?), and to indicate direct address (e.g., Is that you, Steve?).	X
L.5.2d	Use underlining, quotation marks, or italics to indicate titles of works.	X
L.5.2e	Spell grade-appropriate words correctly, consulting references as needed.	X
L.5.3	Use knowledge of language and its conventions when writing, speaking, reading, or listening.	X
L.5.3a	Expand, combine, and reduce sentences for meaning, reader/listener interest, and style.	
L.5.3b	Compare and contrast the varieties of English (e.g., dialects, registers) used in stories, dramas, or poems.	
L.5.4	Determine or clarify the meaning of unknown and multiple-meaning word and phrases based on grade 5 reading and content, choosing flexibly from a range of strategies.	
L.5.4a	Use context (e.g., cause/effect relationships and comparisons in text) as a clue to the meaning of a word or phrase.	
L.5.4b	Use common, grade-appropriate Greek and Latin affixes and roots as clues to the meaning of a word (e.g., photograph, photosynthesis).	
L.5.4	Consult reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation and determine or clarify the precise meaning of key words and phrases.	
L.5.5	Demonstrate understanding of figurative language, word relationships and nuances in word meanings.	
L.5.5a	Interpret figurative language, including similes and metaphors, in context.	
L.5.5b	Recognize and explain the meaning of common idioms, adages, and proverbs.	
L.5.5c	Use the relationship between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.	
L.5.6	Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships (e.g., however, although, nevertheless, similarly, moreover, in addition).	
	Math: Operations and Algebraic Thinking Standards	
5.OA.1	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	
5.OA.2	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation "add 8 and 7, then multiply by 2" as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product.	
5.OA.3	Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.	
	Math: Number and Operations in Base Ten Standards	
5.NBT.1	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.	
5.NBT.2	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.	
5.NBT.3	Read, write, and compare decimals to thousandths.	
5.NBT.3a	Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.	

5.NBT.3b	Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	
5.NBT.4	Use place value understanding to round decimals to any place.	
5.NBT.5	Fluently multiply multi-digit whole numbers using the standard algorithm.	
5.NBT.6	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	
5.NBT.7	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	
Math: Number and Operations Fractions Standards		
5.NF.1	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)	
5.NF.2	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.	
5.NF.3	Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?	
5.NF.4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.	
5.NF.5	Interpret multiplication as scaling (resizing), by: Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication and explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n × a)/(n × b) to the effect of multiplying a/b by 1.	
5.NF.6	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	
5.NF.7	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.	
Math - Measurement and Data		
5.MD.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.	X
5.MD.2	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.	
5.MD.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement.	
5.MD.3a	A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.	
5.MD.3b	A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.	
5.MD.4	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	X
5.MD.5	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.	X
5.MD.5a	Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.	
5.MD.5b	Apply the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.	X
5.MD.5c	Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	
Math - Geometry		
5.G.1	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).	
5.G.2	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	
5.G.3	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.	
5.G.4	Classify two-dimensional figures in a hierarchy based on properties.	

Fun With Friction: ISTE Grade 5

	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