National School Library Standards *crosswalk with* Next Generation Science Standards

AASL American Association of School Librarians TRANSFORMING LEARNING

NATIONAL SCHOOL LIBRARY STANDARDS

SHARED FOUNDATION I. Inquire

KEY COMMITMENT: Build new knowledge by inquiring, thinking critically, identifying problems, and developing strategies for solving problems.

DOMAIN	AASL STANDARDS FRAMEWORK FOR LEARNERS	SCIENCE AND ENGINEERING PRACTICES IN THE NGSS			
		K-2	3-5	MS	HS
A. THINK	**Learners display curiosity and initiative by:** 1. Formulating questions about a personal interest or a curricular topic. 2. Recalling prior and background knowledge as context for new meaning.	• Ask questions based on observations to find more information about the designed world. (K-ESS3-2) 1 • Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1) 4 • Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3) 8 • Ask questions based on observations to find more information about the natural and/or designed world. (K-2-ETS1-1) 1	• Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS3-3) 1 • Define a simple problem that can be solved through development of a new or improved object or tool. (3-PS2-4) 1 • Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3) 1 • Define a simple problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1) 1	• Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles. (MS-PS2-3) 1 • Ask questions to identify and clarify evidence of an argument. (MS-ESS3-5) 1 • Define a design problem that can be solved through the development of an object, tool, process, or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. (MS-ETS1-1) 1 • Analyze and interpret data to provide evidence for phenomena. (MS-LS2-1, MS-ESS2-3) 4 • Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-PS1-3, MS-LS1-8, MS-LS4-5) 8	• Ask questions that arise from examining models or a theory to clarify relationships. (HS-LS3-1) 1 • Analyze complex real-world problems by specifying criteria and constraints for successful solutions. (HS-ETS1-1) 1 • Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. (HS-ESS2-2) 4 • Create or revise a simulation of a phenomenon, designed device, process, or system. (HS-LS4-6) 5 • Communicate scientific and technical information (e.g., about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-PS2-6, HS-PS4-5) 8 • Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-ESS3-1) 8 • Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-6) 8
B. CREATE	**Learners engage with new knowledge by following a process that includes:** 1. Using evidence to investigate questions. 2. Devising and implementing a plan to fill knowledge gaps. 3. Generating products that illustrate learning.	• Make observations (firsthand or from media) to collect data that can be used to make comparisons. (K-PS3-1, 1-ESS1-2, 2-LS4-1) 4 • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2, 1-LS3-1, 2-PS1-3) 6 • Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1, 1-ESS1-1) 4 • Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world. (K-ESS3-2) 8 • With guidance, plan and conduct an investigation in collaboration with peers. (K-PS2-1) 3 • Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question. (1-PS4-1, 1-PS4-3, 2-LS2-1) 3 • Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2, K-2-ETS1-2) 2 • Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3) 8 • Develop a model to represent patterns in the natural world. (2-ESS2-2) 2 • Develop a model to describe phenomena. (3-LS1-1, 4-PS4-2, 5-LS2-1) 2 • Define a simple problem that can be solved through development of a new or improved object or tool. (K-2-ETS1-1) 6	• Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2) 6 • Construct an argument with evidence. (3-LS4-3) 7 • Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4) 7 • Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-PS2-2, 4-PS3-2, 4-ESS2-1, 5-PS1-3) 3 • Construct an argument with evidence, data, and/or a model. (3-LS2-1, 4-LS1-1) 7 • Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1, 3-LS4-1, 4-ESS2-2) 4 • Use evidence (e.g., measurements, observations, patterns) to construct an explanation. (4-PS3-1) 6 • Identify the evidence that supports particular points in an explanation. (4-ESS1-1) 6 • Support an argument with evidence, data, or a model. (5-PS2-1, 5-LS1-1, 5-ESS1-1) 7 • Representing data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. (3-ESS2-1) 4 • Develop a model using an analogy, example, or abstract representation to describe a scientific principle. (4-PS4-1) 2 • Develop a model to describe phenomena. (5-PS1-1) 2 • Measure and graph quantities such as weight to address scientific and engineering questions and problems. (5-PS1-2) 5 • Represent data in graphical displays (bar graphs, pictographs, and/or pie charts) to reveal patterns that indicate relationships. (5-ESS1-2) 4 • Develop a model using an example to describe a scientific principle. (5-ESS2-1) 4	• Develop a model to predict and/or describe phenomena. (MS-PS1-1, MS-PS1-4) 2 • Develop and use a model to describe phenomena. (MS-PS4-2, MS-LS1-2, MS-LS2-3, MS-LS3-1, MS-LS3-2, MS-ESS1-1, MS-ESS1-2, MS-ESS2-1, MS-ESS2-6) 2 • Develop a model to describe unobservable mechanisms. (MS-PS1-5, MS-PS3-2, MS-LS1-7, MS-ESS2-4) 2 • Conduct an investigation and evaluate the experimental design to produce data to serve as the basis for evidence that can meet the goals of the investigations. (MS-PS2-5) 3 • Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation. (MS-LS1-1) 3 • Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim. (MS-PS2-2, MS-PS3-4) 3 • Analyze and interpret data to determine similarities and differences in findings. (MS-PS1-2, MS-ESS1-3, MS-ESS3-2, MS-ETS1-3, MS-LS4-1) 4 • Analyze and interpret data to provide evidence for phenomena. (MS-LS2-1, MS-ESS2-3) 4 • Construct and interpret graphical displays of data to identify linear and nonlinear relationships. (MS-PS3-1) 4 • Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints. (MS-PS1-6) 6 • Apply scientific ideas to construct an explanation for real-world phenomena, examples, or events. (MS-LS4-2) 6 • Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-LS1-5, MS-LS1-6, MS-ESS1-4, MS-ESS2-2, MS-ESS3-1) 6 • Construct an oral and written argument supported by evidence to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-LS2-4, MS-ESS3-4) 7 • Construct and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-PS2-4) 7 • Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon. (MS-PS2-4, MS-PS3-5) 7 • Use an oral and written argument supported by evidence to support or refute an explanation or a model for a phenomenon. (MS-LS1-3) 7 • Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings. (MS-PS4-3) 8	• Develop a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-PS1-4, HS-PS1-8, HS-LS2-5, HS-ESS1-1, HS-ESS2-1, HS-ESS2-3, HS-ESS2-6) 2 • Use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-4, HS-LS1-5, HS-LS1-7) 2 • Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-PS3-2, HS-PS3-5, HS-LS1-2) 2 • Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-PS1-3, HS-PS2-5, HS-PS3-4, HS-LS1-3, HS-ESS2-5) 3 • Create a computational model or simulation of a phenomenon, designed device, process, or system. (HS-PS3-1, HS-ESS3-3) 5 • Create or revise a simulation of a phenomenon, designed device, process, or system. (HS-LS4-6) 5 • Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-1, HS-LS4-2, HS-LS4-4, HS-ESS1-2, HS-ESS3-1) 6 • Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-PS1-2, HS-LS1-6, HS-LS2-3) 6 • Apply scientific reasoning to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion. (HS-ESS1-6) 6 • Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence. (HS-LS3-2) 7 • Construct an oral and written argument or counter-arguments based on data and evidence. (HS-ESS2-7) 7

The eight categories of science and engineering practices identified as essential for all learners in *A Science Framework for K-12 Science Education* (2012), the blueprint for development of the NGSS:

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

CONTINUED ON REVERSE

The Next Generation Science Standards Crosswalk Task Force recognizes that sets of standards vary in their nature and level of specificity or generality. When cross-walking standards sets, it is prudent and necessary to leave some interpretation open to the professional educator. Due to the language of *Next Generation Science Standards* (2013), www.nextgenscience.org, it has only been cross-walked to the *AASL Standards Framework for Learners*. For more on how school librarians and school libraries support learning in the sciences, see the AASL Standards Frameworks related to School Librarians and School Libraries.

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AASL American Association of School Librarians TRANSFORMING LEARNING

NATIONAL SCHOOL LIBRARY STANDARDS

SHARED FOUNDATION I. Inquire

KEY COMMITMENT: Build new knowledge by inquiring, thinking critically, identifying problems, and developing strategies for solving problems.

DOMAIN	AASL STANDARDS FRAMEWORK FOR LEARNERS	SCIENCE AND ENGINEERING PRACTICES IN THE NGSS			
		K-2	3-5	MS	HS
C. SHARE	**Learners adapt, communicate, and exchange learning products with others in a cycle that includes:** 1. Interacting with content presented by others. 2. Providing constructive feedback. 3. Acting on feedback to improve. 4. Sharing products with an authentic audience.	• Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3) 8	• Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-ESS3-1, 3-LS4-4) 7	• Construct and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-PS2-4) 7 • Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon. (MS-PS3-5) 7 • Evaluate competing design solutions based on jointly developed and agreed-upon criteria. (MS-LS2-5, MS-ETS1-2) 7 • Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings. (MS-PS4-3) 8	• Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence. (HS-LS3-2) 7 • Communicate scientific information (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-LS4-1) 8 • Communicate scientific and technical information or ideas (e.g., the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-PS2-6) 8 • Communicate technical information or ideas (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-PS4-5) 8
D. GROW	**Learners participate in an ongoing inquiry-based process by:** 1. Continually seeking knowledge. 2. Engaging in sustained inquiry. 3. Enacting new understanding through real-world connections. 4. Using reflection to guide informed decisions.	• Ask questions based on observations to find more information about the designed world(s). (K-ESS3-2) 1 • Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1) 1 • Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) 1	• Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4) 1 • Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) 1 • Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3) 1 • Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1) 1 • Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2) 6 • Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (4-PS4-3, 4-ESS3-2) 6	• Ask questions to identify and clarify evidence of an argument. (MS-ESS3-5) 1 • Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles. (MS-PS2-3) 1 • Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. (MS-ETS1-1) 1	• Evaluate questions that challenge the premise(s) of an argument, the interpretation of a data set, or the suitability of a design. (HS-PS4-2) 1 • Ask questions that arise from examining models or a theory to clarify relationships. (HS-LS3-1) 1 • Analyze complex real-world problems by specifying criteria and constraints for successful solutions. (HS-ETS1-1) 1

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3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

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SHARED FOUNDATION II. Include

KEY COMMITMENT: Demonstrate an understanding of and commitment to inclusiveness and respect for diversity in the learning community.

DOMAIN	AASL STANDARDS FRAMEWORK FOR LEARNERS	SCIENCE AND ENGINEERING PRACTICES IN THE NGSS			
		K-2	3-5	MS	HS
A. THINK	**Learners contribute a balanced perspective when participating in a learning community by:** 1. Articulating an awareness of the contributions of a range of learners. 2. Adopting a discerning stance toward points of view and opinions expressed in information resources and learning products. 3. Describing their understanding of cultural relevancy and placement within the global learning community.			• Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings. (MS-PS4-3) 8	• Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. (HS-PS4-3, HS-LS2-6) 7 • Evaluate the evidence behind currently accepted explanations to determine the merits of arguments. (HS-LS2-8, HS-LS4-5) 7 • Evaluate the validity and reliability of multiple claims that appear in scientific and technical texts or media reports, verifying the data when possible. (HS-PS4-4) 8
B. CREATE	**Learners adjust their awareness of the global learning community by:** 1. Interacting with learners who reflect a range of perspectives. 2. Evaluating a variety of perspectives during learning activities. 3. Representing diverse perspectives during learning activities.			• Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-PS1-3, MS-LS1-8, MS-LS4-5) 8 • Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings. (MS-PS4-3) 8	
C. SHARE	**Learners exhibit empathy with and tolerance for diverse ideas by:** 1. Engaging in informed conversation and active debate. 2. Contributing to discussions in which multiple viewpoints on a topic are expressed.	• Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3) 7			
D. GROW	**Learners demonstrate empathy and equity in knowledge building within the global learning community by:** 1. Seeking interactions with a range of learners. 2. Demonstrating interest in other perspectives during learning activities. 3. Reflecting on their own place within the global learning community				

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6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

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SHARED FOUNDATION III. Collaborate

KEY COMMITMENT: Work effectively with others to broaden perspectives and work toward common goals.

DOMAIN	AASL STANDARDS FRAMEWORK FOR LEARNERS	SCIENCE AND ENGINEERING PRACTICES IN THE NGSS			
		K-2	3-5	MS	HS
A. THINK	**Learners identify collaborative opportunities by:** 1. Demonstrating their desire to broaden and deepen understandings. 2. Developing new understandings through engagement in a learning group. 3. Deciding to solve problems informed by group interaction.	• With guidance, plan and conduct an investigation in collaboration with peers. (K-PS2-1) 3 • Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question. (1-PS4-1, 1-PS4-3) 3 • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-PS1-1, 2-LS2-1) 3	• Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (5-PS1-4) 3 • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-PS2-1, 3-5-ETS1-3) 3	• Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim. (MS-PS2-2, MS-PS3-4) 3	• Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-PS1-3, HS-PS2-5, HS-PS3-4, HS-LS1-3, HS-ESS2-5) 3
B. CREATE	**Learners participate in personal, social, and intellectual networks by:** 1. Using a variety of communication tools and resources. 2. Establishing connections with other learners to build on their own prior knowledge and create new knowledge.	• Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3) 8 • Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3) 8	• Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2, 4-ESS3-1) 8 • Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1) 8	• Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-PS1-3, MS-LS1-8, MS-LS4-5) 8 • Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings. (MS-PS4-3) 8	• Communicate scientific ideas (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-ESS1-3) 8 • Communicate scientific information (e.g., about the process of development and the design and performance of a proposed process or system) in multiple formats (including graphically, textually, and mathematically). (HS-LS4-1) 8 • Communicate technical information or ideas (e.g., about the process of development and the design and performance of a proposed process or system) in multiple formats (including graphically, textually, and mathematically). (HS-PS4-5) 8 • Communicate scientific and technical information (e.g., about the process of development and the design and performance of a proposed process or system) in multiple formats (including graphically, textually, and mathematically). (HS-PS2-6) 8
C. SHARE	**Learners work productively with others to solve problems by:** 1. Soliciting and responding to feedback from others. 2. Involving diverse perspectives in their own inquiry processes.				• Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS4-2, HS-LS4-4, HS-LS1-1, HS-ESS1-2) 6
D. GROW	**Learners actively participate with others in learning situations by:** 1. Actively contributing to group discussions. 2. Recognizing learning as a social responsibility.			• Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-LS-2-5, MS-ETS1-2) 7	

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SHARED FOUNDATION IV. Curate

KEY COMMITMENT: Make meaning for oneself and others by collecting, organizing, and sharing resources of personal relevance.

DOMAIN	AASL STANDARDS FRAMEWORK FOR LEARNERS	SCIENCE AND ENGINEERING PRACTICES IN THE NGSS			
		K-2	3-5	MS	HS
A. THINK	**Learners act on an information need by:** 1. Determining the need to gather information. 2. Identifying possible sources of information. 3. Making critical choices about information sources to use.			• Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-PS1-3, MS-LS1-8, MS-LS4-5) 8	• Evaluate the validity and reliability of multiple claims that appears in scientific and technical texts or media reports, verifying the data when possible. (HS-PS4-4) 8
B. CREATE	**Learners gather information appropriate to the task by:** 1. Seeking a variety of sources. 2. Collecting information representing diverse perspectives. 3. Systematically questioning and assessing the validity and accuracy of information. 4. Organizing information by priority, topic, or other systematic scheme.	• Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3) 8	• Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2, 4-ESS3-1) 8 • Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1) 8	• Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-PS1-3, MS-LS1-8, MS-LS4-5) 8	• Evaluate the evidence behind currently accepted explanations to determine the merits of arguments. (HS-LS2-8, HS-LS4-5) 7 • Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. (HS-PS4-3, HS-LS2-6) 7 • Evaluate the evidence behind currently accepted explanations to determine the merits of arguments. (HS-LS2-8, HS-LS4-5) 7 • Evaluate the validity and reliability of multiple claims that appear in scientific and technical texts or media reports, verifying the data when possible. (HS-PS4-4) 8
C. SHARE	**Learners exchange information resources within and beyond their learning community by:** 1. Accessing and evaluating collaboratively constructed information sites. 2. Contributing to collaboratively constructed information sites by ethically using and reproducing others' work. 3. Joining with others to compare and contrast information derived from collaboratively constructed information sites.				
D. GROW	**Learners select and organize information for a variety of audiences by:** 1. Performing ongoing analysis of and reflection on the quality, usefulness, and accuracy of curated resources. 2. Integrating and depicting in a conceptual knowledge network their understanding gained from resources. 3. Openly communicating curation processes for others to use, interpret, and validate.		• Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2, 4-ESS3-1) 8 • Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1) 8	• Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-LS1-5, MS-LS1-6, MS-ESS1-4, MS-ESS2-2, MS-ESS3-1) 6 • Integrate qualitative scientific and technical information in written text that contained in media and visual displays to clarify claims and findings. (MS-PS4-3) 8	• Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-1, HS-LS4-2, HS-LS4-4, HS-ESS1-2, HS-ESS3-1) 6 • Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-PS1-2, HS-LS1-6, HS-LS2-3) 6 • Apply scientific reasoning to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion. (HS-ESS1-6) 6

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3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

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National School Library Standards *crosswalk with* Next Generation Science Standards

American Association of School Librarians
TRANSFORMING LEARNING

NATIONAL SCHOOL LIBRARY STANDARDS

SHARED FOUNDATION V. Explore

KEY COMMITMENT: Discover and innovate in a growth mindset developed through experience and reflection.

DOMAIN	AASL STANDARDS FRAMEWORK FOR LEARNERS	SCIENCE AND ENGINEERING PRACTICES IN THE NGSS			
		K-2	3-5	MS	HS
A. THINK	**Learners develop and satisfy personal curiosity by:** 1. Reading widely and deeply in multiple formats and write and create for a variety of purposes. 2. Reflecting and questioning assumptions and possible misconceptions. 3. Engaging in inquiry-based processes for personal growth.	• Ask questions based on observations to find more information about the designed world(s). (K-ESS3-2) 1 • Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1) 1 • Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) 1 • Make observations (firsthand or from media) to collect data that can be used to make comparisons. (K-PS3-1, 1-ESS1-2, 2-LS4-1) 3 • Construct an argument with evidence to support a claim. (K-ESS2-2, 2-PS1-4) 7 • Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2) 8 • Read grade-appropriate texts and/or use media to obtain scientific information to determine patterns in the natural world. (K-ESS3-2) 8 • Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3) 8	• Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4) 1 • Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) 1 • Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-PS2-2) 3 • Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1, 3-LS3-1, 4-ESS2-2) 4 • Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2, 3-LS4-2, 3-LS4-2) 6 • Use evidence (e.g., measurements, observations, patterns) to construct an explanation. (4-PS3-1, 3-LS4-2) 6 • Construct an argument with evidence. (3-LS4-3) 7 • Construct an argument with evidence, data, and/or a model. (3-LS2-1, 4-LS1-1) 7 • Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4, 3-ESS3-1) 7 • Support an argument with evidence, data, or a model. (5-PS2-1, 5-LS1-1, 5-ESS1-1) 7 • Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2, 4-ESS3-1) 8 • Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1) 8	• Develop and use a model to describe phenomena. (MS-PS4-2, MS-LS1-2, MS-LS3-1, MS-LS3-2, MS-ESS1-1-, MS-ESS1-2, MS-ESS2-1, MS-ESS2-6) 2	
B. CREATE	**Learners construct new knowledge by:** 1. Problem solving through cycles of design, implementation, and reflection. 2. Persisting through self-directed pursuits by tinkering and making.	• Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) 1 • Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2, K-2-ETS1-2) 2 • Compare multiple solutions to a problem. (2-ESS2-1) 4 • Analyze data from tests of an object or tool to determine if it works as intended. (K-PS2-2, 2-PS1-2, K-2-ETS1-3) 4 • Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) 6 • Use tools and materials provided to design a device that solves a specific problem or a solution to a specific problem. (1-PS4-4) 6 • Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1) 6 • Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem. (K-PS3-2) 6	• Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1) 1 • Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4) 1 • Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-PS2-2) 3 • Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-PS4-3, 4-ESS3-2, 3-5-ETS1-2) 6 • Apply scientific ideas to solve design problems. (4-PS3-4) 6 • Develop models to describe phenomena (3-LS1-1) 3 • Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2) 3	• Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. (MS-ETS-1) 1 • Develop a model to predict and/or describe phenomena. (MS-PS1-1, MS-PS1-4) 2 • Develop and use a model to describe phenomena. (MS-PS4-2, MS-LS1-2, MS-LS3-1, MS-LS3-2, MS-ESS1-1, MS-ESS1-2, MS-ESS2-1, MS-ESS2-6) 2 • Develop a model to describe unobservable mechanisms. (MS-PS1-5, MS-LS1-7, MS-ESS2-4, MS-PS3-2) 2 • Develop a model to generate data to test ideas about design systems, including those representing inputs and outputs. (MS-ETS1-4) 2 • Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions. (MS-ESS2-5) 3 • Use mathematical representations to support scientific conclusions and design solutions. (MS-LS4-6) 5 • Use mathematical representations to describe and/or support scientific conclusions and design solutions. (MS-PS4-1) 5 • Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints. (MS-PS1-6) 6 • Apply scientific ideas or principles to design an object, tool, process, or system. (MS-PS2-1) 6 • Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process or system. (MS-PS3-3) 6 • Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-LS2-5, MS-ETS1-2) 7 • Apply scientific principles to design an object, tool, process or system. (MS-ESS3-3) 6	• Analyze complex real-world problems by specifying criteria and constraints for successful solutions. (HS-ETS1-1) 1 • Use mathematical models and/or computer simulations to predict the effects of a design solutions on systems and/or the interactions between systems. (HS-ETS1-4) 2 • Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-PS3-2, HS-PS3-5, HS-LS1-2) 2 • Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optional design solution. (HS-PS2-1, HS-ESS2-2) 4 • Apply concepts of statistics and probability (including determine function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. (HS-LS3-3, HS-LS4-3) 4 • Apply scientific ideas to solve a design problem, taking into account possible unanticipated effects. (HS-PS2-3) 6 • Apply scientific principles and evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects. (HS-PS1-5) 6 • Refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ETS1-2) 6 • Design or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ESS3-4) 6 • Evaluate a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ETS1-3) 6 • Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-PS3-3, HS-LS2-7) 6 • Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-LS2-7) 6 • Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and logical accounts regarding relevant factors (e.g., economic, societal, environmental, ethical considerations). (HS-ESS3-2) 7

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6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

CONTINUED ON REVERSE

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National School Library Standards *crosswalk with* Next Generation Science Standards

AASL American Association of School Librarians TRANSFORMING LEARNING

NATIONAL SCHOOL LIBRARY STANDARDS

SHARED FOUNDATION V. Explore

KEY COMMITMENT: Discover and innovate in a growth mindset developed through experience and reflection.

DOMAIN	AASL STANDARDS FRAMEWORK FOR LEARNERS	SCIENCE AND ENGINEERING PRACTICES IN THE NGSS			
		K-2	3-5	MS	HS
C. SHARE	**Learners engage with the learning community by:** 1. Expressing curiosity about a topic of personal interest or curricular relevance. 2. Co-constructing innovative means of investigation. 3. Collaboratively identifying innovative solutions to a challenge or problem.	• Ask questions based on observations to find more information about the designed world. (K-ESS3-2) 1 • Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1) 1 • With guidance, plan and conduct an investigation in collaboration with peers. (K-PS2-1) 3 • Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question. (1-PS4-1, 1-PS4-3, 2-PS1-1, 2-LS2-1) 3 • Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1) 6	• Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) 1 • Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3) 1 • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-PS2-1, 3-5-ETS1-3) 3	• Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles. (MS-PS2-3) 1	• Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-PS1-3, HS-PS2-5, HS-PS3-4, HS-LS1-3, HS-ESS2-5) 3 • Ask questions that arise from examining models or a theory to clarify relationships. (HS-LS3-1) 1
D. GROW	**Learners develop through experience and reflection by:** 1. Iteratively responding to challenges. 2. Recognizing capabilities and skills that can be developed, improved, and expanded. 3. Open-mindedly accepting feedback for positive and constructive growth.	• Analyze data from tests of an object or tool to determine if it works as intended. (K-PS2-2, 2-PS1-2, K-2-ETS1-3) 4	• Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-PS-2-2) 3	• Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions. (MS-ESS2-5) 3	• Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. (HS-PS2-1, HS-ESS2-2) 4 • Use mathematical representations of phenomena or design solutions to support and revise explanations. (HS-LS2-2) 5 • Create or revise a simulation of a phenomenon, designed device, process, or system. (HS-LS4-6) 5 • Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-6, HS-LS2-3, HS-PS1-2) 6 • Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-PS3-3) 6 • Refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-PS1-6) 6

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NATIONAL SCHOOL LIBRARY STANDARDS

SHARED FOUNDATION VI. Engage

KEY COMMITMENT: Demonstrate safe, legal, and ethical creating and sharing of knowledge products independently while engaging in a community of practice and an interconnected world.

DOMAIN	AASL STANDARDS FRAMEWORK FOR LEARNERS	SCIENCE AND ENGINEERING PRACTICES IN THE NGSS			
		K-2	3-5	MS	HS
A. THINK	**Learners follow ethical and legal guidelines for gathering and using information by:** 1. Responsibly applying information, technology, and media to learning. 2. Understanding the ethical use of information, technology, and media. 3. Evaluating information for accuracy, validity, social and cultural context, and appropriateness for need.		• Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2, 4-ESS3-1, 5-ESS3-1) 8	• Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-LS1-5, MS-LS1-6, MS-ESS1-4, MS-ESS2-2, MS-ESS3-1) 6 • Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-PS1-3, MS-LS1-8, MS-LS4-5) 8 • Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings. (MS-PS4-3) 8	• Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-1, HS-LS4-2, HS-LS4-4, HS-ESS1-2, HS-ESS3-1) 6 • Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-PS1-2, HS-LS1-6, HS-LS2-3) 6 • Design or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ESS3-4) 6 • Evaluate a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ETS1-3) 6 • Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-PS3-3, HS-LS2-7) 6 • Apply scientific reasoning to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion. (HS-ESS1-6) 6 • Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. (HS-PS4-3, HS-LS2-6) 7 • Evaluate the evidence behind currently accepted explanations to determine the merits of arguments. (HS-LS2-8, HS-LS4-5, HS-ESS1-5) 7 • Evaluate evidence behind currently accepted explanations or solutions to determine the merits of arguments. (HS-ESS1-5) 7 • Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and logical arguments regarding relevant factors (e.g., economic, societal, environmental, ethical considerations). (HS-ESS3-2) 7 • Evaluate the validity and reliability of multiple claims that appear in scientific and technical texts or media reports, verifying the data when possible. (HS-PS4-4) 7 • Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-ESS1-2, HS-LS1-1, HS-LS4-2, HS-LS4-4, HS-ESS3-1) 8 • Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-PS1-2, HS-LS1-6, HS-LS2-3) 8 • Evaluate the validity and reliability of multiple claims that appear in scientific and technical texts or media reports, verifying the data when possible. (HS-PS4-4) 8 • Design a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ETS1-2) 6
B. CREATE	**Learners use valid information and reasoned conclusions to make ethical decisions in the creation of knowledge by:** 1. Ethically using and reproducing others' work. 2. Acknowledging authorship and demonstrating respect for the intellectual property of others. 3. Including elements in personal-knowledge products that allow others to credit content appropriately.				
C. SHARE	**Learners responsibly, ethically, and legally share new information with a global community by:** 1. Sharing information resources in accordance with modification, reuse, and remix policies. 2. Disseminating new knowledge through means appropriate for the intended audience.	• Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3) 8	• Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. (5-ESS1-2) 8		• Communicate scientific and technical information (e.g., about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-PS2-6) 8 • Communicate scientific information (e.g., about phenomena and/or the process of development and the design performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-LS4-1, HS-ESS1-3) 8 • Communicate technical informatino or ideas (e.g., about the process of development and the design and performance of a proposed process of system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-PS4-5) 8
D. GROW	**Learners engage with information to extend personal learning by:** 1. Personalizing their use of information and information technologies. 2. Reflecting on the process of ethical generation of knowledge. 3. Inspiring others to engage in safe, responsible, ethical, and legal information behaviors.				

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