Science: Investigating

Competency: Designing and conducting investigations to explore questions, test hypotheses, refine methods, and examine real- world phenomena.

Grade Level Competency: Kindergarten
Students will design and conduct an investigation to answer a question or explore a phenomena.

Criteria	Extending	Proficient	In Progress	Beginning
Design Includes question, hypothesis, variables, procedure, data table, future studies, etc.	A complex performance or application of learning that is transferred to new or novel situations beyond the content area, makes extended or abstract connections to authentic, real-world, multifaceted situations, and/or constructs entirely new ideas that are transformational.	I can describe the steps of a guided investigation.	I can describe some of the steps of a guided investigation.	I can name or identify the steps of a guided investigation.
Conduct Includes prewritten procedures		I can follow the steps of a guided scientific investigation.	I can follow some of the steps in a guided scientific investigation.	I can follow some of the steps in a guided scientific investigation with help.

MDE grade level benchmarks embedded explicitly in the rubric

Kindergarten

0E.1.1.1.1 Ask questions to obtain information from weather forecasts to prepare for and respond to severe weather.* (P: 1, CC: 7, CI: ESS3, ETS2)

0P.1.2.1.1 Collect and organize observational data to determine the effect of sunlight on Earth's surface. (P: 3, CC: 2, CI: PS3, ETS2)

0E.2.1.1.2 Make daily and seasonal observations of local weather conditions to describe patterns over time.** (P: 4, CC: 1, CI: ESS2)

0L.1.2.1.2 Make observations of plants and animals to compare the diversity of life in different habitats. (P: 3, CC: 1, CI: LS4)

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Learning Progressions
Kindergarten
Supporting Benchmarks
Kindergarten
0E.1.1.1.2 Ask questions about how a person may reduce the amount of natural resources the individual uses.* (P: 1, CC: 2, CI: ESS3)

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Grade Level Competency: Grades 1-2 Students will design and conduct an investigation to answer a question or explore a phenomena.				
Criteria	Extending	Proficient	In Progress	Beginning
Design Includes question, hypothesis, variables, procedure, data table, future studies, etc.	A complex performance or application of learning that is transferred to new or novel situations beyond the content area, makes extended or abstract connections to authentic, real-world, multifaceted situations, and/or constructs entirely new ideas that are transformational.	I can plan one or more parts of a guided investigation. ☐ Grade 1 ☐ Grade 2	I can plan parts of a guided investigation with support. ☐ Grade 1 ☐ Grade 2	I can identify the steps involved in a guided investigation. ☐ Grade 1 ☐ Grade 2
Conduct Includes prewritten procedures		I can carry out the steps of a guided investigation. ☐ Grade 1 ☐ Grade 2	I can carry out some steps of a guided investigation. ☐ Grade 1 ☐ Grade 2	I am acquiring the skills to carry out parts of a guided investigation. ☐ Grade 1 ☐ Grade 2

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MDE grade level benchmarks embedded explicitly in the rubric	
Grade 1 1P.1.2.1.1 Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. (P: 3, CC: 2, CI: PS4) 1L.3.2.2.2 Plan and design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.* (P: 6, CC: 6, CI: LS1, ETS2)	**Grade 2** 2P.1.2.1.1 Plan and conduct an investigation to describe how heating and cooling affects different kinds of materials based upon their observable properties. (P: 3, CC: 1, CI: PS1)

Learning Progressions	
Grade 1	**Grade 2**
☐ I can make a prediction. (1P.1.2.1.1)	☐ I can explain my reasoning behind my prediction. (2P.1.2.1.1)
Supporting Benchmarks	
Grade 1	**Grade 2**

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Grade Level Competency: Grades 3-4 Students will design and conduct an investigation to answer a question or explore a phenomena.				
Criteria	Extending	Proficient	In Progress	Beginning
Design Includes question, hypothesis, variables, procedure, data table, future studies, etc.	A complex performance or application of learning that is transferred to new or novel situations beyond the content area, makes extended or abstract connections to authentic, real-world, multifaceted situations, and/or constructs entirely new ideas that are transformational.	I can plan a focused investigation to answer a question or explore a phenomenon. ☐ Grade 3 ☐ Grade 4	I can plan parts of a focused investigation to answer a question or explore a phenomenon. ☐ Grade 3 ☐ Grade 4	I can plan one or more parts of a focused investigation to answer a question or explore a phenomenon with support. ☐ Grade 3 ☐ Grade 4
Conduct Includes prewritten procedures		I can carry out a focused investigation to answer a question or explore a phenomenon. ☐ Grade 3 ☐ Grade 4	I can carry out parts of a focused investigation to answer a question or explore a phenomenon. ☐ Grade 3 ☐ Grade 4	I can carry out a guided investigation to answer a question or explore a phenomenon. ☐ Grade 3 ☐ Grade 4

Science: Investigating

Competency: Designing and conducting investigations to explore questions, test hypotheses, refine methods, and examine real-world phenomena.

MDE grade level benchmarks embedded explicitly in the rubric	
Grade 3 3P.1.2.1.1 Plan and conduct a controlled investigation to determine the effect of placing objects made with different materials in the path of a beam of light. (P: 3, CC: 2, CI: PS4) 3L.1.2.1.2 Plan and conduct an investigation to determine how amounts of sunlight and water impact the growth of a plant. (P: 3, CC:2, CI: LS2) 1L.1.1.1.1 Ask questions based on observations about the similarities and differences between young plants and animals and their parents. (P: 1, CC: 2, CI: LS3) 3P.1.1.1.1 Ask questions based on observations about why objects in darkness can be seen only when illuminated. (P: 1, CC: 2, CI: PS4)	**Grade 4** 4E.1.2.1.1 Make observations and measurements to provide evidence of the effects of weathering or the rate of erosion by the forces of water, ice, wind, or vegetation.* (P: 3, CC: 2, CI: ESS2) 4P.1.1.2.1 Define a simple design problem that can be solved by applying scientific ideas about magnets.* (P: 1, CC: 2, CI: PS2, ETS2) 4E.1.2.1.2 Plan and carry out fair tests in which variables are controlled and failure points are considered to improve a model or prototype to prevent erosion.* (P: 3, CC: 2, CI: ESS2, ETS1, ETS2)

Learning Progressions	
Grade 3	**Grade 4**
☐ I can record observations or findings throughout an investigation. (3P.1.2.1.1; 3L.1.2.1.2)	☐ I can record detailed observations about my findings throughout the investigation (4E.1.2.1.1)
Supporting Benchmarks	
Grade 3	**Grade 4**
	4E.1.1.1.2 Ask questions about how water moves through the Earth system and identify the type of question. (P: 1, CC: 5, CI: ESS2)

Science: Investigating

Competency: Designing and conducting investigations to explore questions, test hypotheses, refine methods, and examine real-world phenomena.

Grade Level Competency: Grades 5-6: Students will design and conduct appropriate investigations to explore real-world problems or phenomena.				
Criteria	Extending	Proficient	In Progress	Beginning
Design Includes question, hypothesis, variables, procedure, data table, future studies, etc.	A complex performance or application of learning that is transferred to new or novel situations beyond the content area, makes extended or abstract connections to authentic, real-world, multifaceted situations, and/or constructs entirely new ideas that are transformational.	I can design an investigation using key elements to address a real-world problem or phenomenon. ☐ Grade 5 ☐ Grade 6	I can design parts of an investigation and use key elements to address real-world problems or phenomena. ☐ Grade 5 ☐ Grade 6	I can plan parts of an investigation to address a real-world problem or phenomenon. ☐ Grade 5 ☐ Grade 6
Conduct Includes prewritten procedures		I can follow each step of my investigation to answer a question. I can gather evidence effectively and precisely to address the problem or question. ☐ Grade 5 ☐ Grade 6	I can follow each step of my investigation. I can gather evidence to address the problem or question. ☐ Grade 5 ☐ Grade 6	I can follow parts of my investigation to answer a question. I can use provided evidence to address the problem or question. ☐ Grade 5 ☑ Grade 6

Science: Investigating

Competency: Designing and conducting investigations to explore questions, test hypotheses, refine methods, and examine real-world phenomena.

MDE grade level benchmarks embedded explicitly in the rubric	
Grade 5	**Grade 6**

5P.1.2.1.2 Evaluate appropriate methods and tools to identify materials based on their properties prior to investigation. (P: 3, CC: 3, CI: PS1) 5L.1.2.1.3 Plan and conduct an investigation to obtain evidence that plants get the materials they need for growth chiefly from air and water. (P: 3, CC: 5, CI: LS1) 5P.3.2.2.1 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.* (P: 6, CC: 5, CI: PS3, ETS1, ETS2)	6E.1.2.1.1 Collect data and use digital data analysis tools to identify patterns to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.** (P: 3, CC: 2, CI: ESS2) 6E.3.2.1.3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.* (P: 6, CC: 2, CI: ESS3, ETS1) 6E.1.1.1.1 Ask questions that arise from observations of patterns in the movement of night sky objects to test the limitations of a solar system model. (P: 1, CC: 1, CI: ESS1)

Learning Progressions	
Grade 5	**Grade 6**
☐ Ask investigatable questions and predict reasonable outcomes about the changes in energy, related to speed, that occur when objects interact. (P: 1, CC: 5, CI: PS3, 5P.1.1.1.1) ☐ Conduct an investigation to determine whether the mixing of two or more substances results in new substances. (P: 3, CC: 2, CI: PS1, 5P.1.2.1.1)	☐ Ask questions to examine an interpretation about the relative ages of different rock layers within a sequence of several rock layers. (P: 1, CC: 1, CI: ESS1 6E.1.1.1.2)
Supporting Benchmarks	
Grade 5	**Grade 6**

Science: Investigating

Competency: Designing and conducting investigations to explore questions, test hypotheses, refine methods, and examine real-world phenomena.

Grade Level Competency: Grades 7-8 Students will design and conduct appropriate investigations to explore real-world problems or phenomena.				
Criteria	Extending	Proficient	In Progress	Beginning
Design Includes question, hypothesis, variables, procedure, data table, future studies, etc.	A complex performance or application of learning that is transferred to new or novel situations beyond the content area, makes extended or abstract connections to authentic, real-world, multifaceted situations, and/or constructs entirely new ideas that are transformational.	I can design a majority of the elements of a scientific investigation to address a problem or phenomena. ☐ Grade 7 ☐ Grade 8	I can design some pieces of a scientific investigation with ongoing feedback for improvement. ☐ Grade 7 ☐ Grade 8	I can design pieces of a scientific investigation in isolation. (example: Write a question or design a data table) ☐ Grade 7 ☐ Grade 8
Conduct Includes prewritten procedures		I can accurately follow a procedure to gather data effectively and precisely. I can utilize appropriate scientific tools to collect data. ☐ Grade 7 ☐ Grade 8	I can follow a procedure to gather imprecise data with appropriate tools.. ☐ Grade 7 ☐ Grade 8	I can follow a procedure with guidance to collect data. ☐ Grade 7 ☐ Grade 8

Science: Investigating

Competency: Designing and conducting investigations to explore questions, test hypotheses, refine methods, and examine real-world phenomena..

MDE grade level benchmarks embedded explicitly in the rubric	
Grade 7	**Grade 8**

7L.1.1.1.2 Ask questions that arise from careful observations of phenomena or models to clarify and/or seek additional information about how changes in genes can affect organisms. (P: 1, CC: 6, CI: LS3) 7L.1.2.1.1 Conduct an investigation to provide evidence that living things are made of cells, either one cell or many different numbers and types of cells. (P: 3, CC: 3, CI: LS1)	8P.1.1.1.2 Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. (P: 1, CC: 2, CI: PS2) 8P.1.2.1.1 Plan and conduct an investigation of changes in pure substances when thermal energy is added or removed and relate those changes to particle motion. (P: 3, CC: 2, CI: PS1) 8P.1.2.1.2 Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. (P: 3, CC: 7, CI: PS2) 8P.1.2.1.3 Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. (P: 3, CC: 2, CI: PS2) 8P.1.2.1.4 Plan and conduct an investigation to determine how the temperature of a substance is affected by the transfer of energy, the amount of mass, and the type of matter. (P: 3, CC: 2, CI: PS3) 8P.3.2.2.1 Construct, test and modify a device that either releases or absorbs thermal energy by chemical processes.* (P: 6, CC: 5, CI: PS1, ETS1) 8P.3.2.2.2 Design a solution to a problem involving the motion of two colliding objects using Newton's 3rd Law.* (P: 6, CC: 4, CI: PS2, ETS1) 8P.3.2.2.3 Design, construct, and test a device that either minimizes or maximizes thermal energy transfer.* (P: 6, CC: 5, CI: PS3, ETS1) 8P.4.2.1.1 Gather and evaluate information from multiple sources to describe that synthetic materials come from natural resources and impact society. (P: 8, CC: 6, CI: PS1)

Learning Progressions	
Grade 7	**Grade 8**
☐ 7L.1.1.1.1 Ask questions about the processes and outcomes of various methods of communication between cells of multicellular organisms. (P: 1, CC: 6, CI: LS1)	☐ 8P.1.1.1.1 Ask questions about locations of common elements on the periodic table to note patterns in the properties of similarly grouped elements. (P: 1, CC: 1, CI: PS1)
Supporting Benchmarks	
Grade 7	**Grade 8**

Science: Investigating

Competency: Designing and conducting investigations to explore questions, test hypotheses, refine methods, and examine real-world phenomena.

Grade Level Competency: Grades 9-12
Students will design and conduct an experimental or research investigation. Students will determine the necessary procedure and refinements needed for a successful investigation.

Criteria	Extending	Proficient	In Progress	Beginning
Design Includes question, hypothesis, variables, procedure, data table, future studies, etc.	A complex performance or application of learning that is transferred to new or novel situations beyond the content area, makes extended or abstract connections to authentic, real-world, multifaceted situations, and/or constructs entirely new ideas that are transformational.	I can make a comprehensive design of a repeatable scientific investigation that addresses a specific problem or phenomenon.	I can design a repeatable scientific investigation that addresses a specific problem or phenomenon.	I can design a scientific investigation with some elements that addresses a specific problem or phenomenon.
Conduct Includes prewritten procedures		I can gather relevant data precisely while making adjustments as needed to make improvements.	I can gather relevant data while making adjustments as needed to make improvements.	I can gather some data that is partially relevant.

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MDE grade level benchmarks embedded explicitly in the rubric

Earth/Space:
9E.1.1.1.1 Ask questions to clarify how seismic energy traveling through Earth's interior can provide evidence for Earth's internal structure. (P: 1, CC: 6,CI: ESS2)
9E.1.2.1.1 Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. (P: 3, CC: 6, CI: ESS2)
9E.1.2.1.2 Plan and conduct an investigation of the properties of soils to model the effects of human activity on soil resources. (P: 3, CC: 2, CI: ESS3, ETS2)

Biology:
9L.1.1.1.1 Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. (P: 1, CC: 2, CI: LS3
9L.1.2.1.1 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (P: 3, CC: 7, CI: LS1)
9L.2.1.1.1 Apply concepts of probability to explain and predict the variation and distribution of expressed traits in a population. (P: 4, CC: 3, CI: LS3)

Chemistry:
9C.1.2.1.1 Plan and conduct an investigation to gather evidence to compare the structure of substances and infer the strength of electrical forces between particles. (P: 3, CC: 1, CI: PS1)
9C.1.2.1.2 Plan and conduct an investigation of acid-base reactions to test ideas about the concentrations of the hydronium ion in an aqueous solution (pH). (P:3, CC: 3, CI: PS1)
9C.4.2.1.2 Review text and online sources to develop a series of questions regarding the chemistry, utility, and safety of nuclear fission. (P: 8, CC: 7,CI: PS1)

Physics:
9P.1.2.1.1 Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current. (P: 3, CC: 2, CI: PS2)
9P.1.2.1.2 Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are combined within a closed system results in a more uniform energy distribution among the components in the system. (P: 3, CC: 3, CI: PS3)

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Learning Progressions	
Earth Space	**Biology**

☐	☐ Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. (9L.1.1.1.1) ☐ Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (9L.1.2.1.1) ☐ Apply concepts of probability to explain and predict the variation and distribution of expressed traits in a population. (9L.2.1.1.1)

Supporting Benchmarks	
Earth/Space	**Biology**
	Complete Replication, Transcription and translation using the genetic code (9L.1.1.1.1) Understand the steps and differences between Mitosis and Meiosis (9L.1.1.1.1)

Learning Progressions	
Chemistry	**Physics**
☐ 9C.1.1.1.1 Ask questions about the impact of greenhouse gases on the Earth's climate by analyzing their molecular structure and responses during energy absorption (P: 1, CC: 5, CI: PS1) ☐ Determine the properties of a chemical based on its pH (9C.1.2.1.2)	

Supporting Benchmarks	
Chemistry	**Physics**
Describe substances and their properties using intermolecular forces (9C.1.2.1.1) Properties of acids and bases (9C.1.2.1.2.) Calculate pH and hydronium ion concentration (9C.1.2.1.2) Compare and contrast various energy sources and evaluate their pro/cons	

(pollution, safety, expense, greenhouse gasses) (9C.1.1.1.1)	