MONTESSORI CURRICULUM TO STANDARDS ALIGNMENT

ELEMENTARY • 1ST–6TH GRADE

PHYSICAL SCIENCE

NATIONAL CENTER for
MONTESSORI in the PUBLIC SECTOR

Montessori Curriculum to Standards Alignment
Elementary • 1st–6th Grade
Physical Science

National Center for Montessori in the Public Sector

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Assessment vocabulary drawn from Marzano Resources free online resource, Basic Vocabulary Terms (marzanoresources.com/media/documents/reproducibles/vocab-common-core/basic-terms-and-phrases.pdf)

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CHAPTER 1

MATTER AND LAWS

MATTER AND LAWS

SKILLS INVENTORY

Lower Elementary

Demonstrates understanding that different types of matter exist and that temperature impacts matter in different ways.

Upper Elementary

Demonstrates understanding that matter can be subdivided into particles that are too small to be seen, that the mixture of two or more different substances may produce a new substance.

MONTESSORI LESSONS	PURPOSES
INITIAL SERIES	
DIFFERENT WAYS OF COMBINING	
Combining • Mixture • Suspension • Solution	• To introduce the concept and nomenclature for physical combinations of materials: mixture, suspension, solution. • To give the children the opportunity to practice hand control and learn the basics of using scientific apparatus safely. • To become familiar with a mixture in chemistry. • To invite interest in chemistry and experimentation. • To become familiar with a suspension in chemistry. • To invite interest in chemistry and experimentation. • To become familiar with a solution in chemistry. • To invite interest in chemistry and experimentation.
Chemical Change • Color Change • Gas Produced • Precipitate • Temperature Change • Light Emitted	• To introduce the concept and nomenclature for chemical changes of material combinations. • To give the children the opportunity to practice hand control and learn the basics of using scientific apparatus safely. • To invite interest in chemistry and experimentation.

continues

MONTESSORI LESSONS	PURPOSES
Separating • Mixture • Suspension • Solution • Chemical Compound	• To demonstrate that physical combinations can be separated, but chemical compounds can't be. • To give the children the opportunity to practice hand control and learn the basics of using scientific apparatus safely. • To invite interest in chemistry and experimentation. • To understand that a mixture can be separated. • To understand that a suspension can be separated. • To understand that a solution can be separated. • To understand that a chemical compound cannot be separated
Saturation and Crystallization • Saturated Solution • Supersaturated Solution • Crystallization	• To demonstrate the formation of crystals as in the early formation of the Earth. • To explore in further detail the idea that the oceans "filled up with poison" introduced in The Coming of Life story. • To create the connection between chemistry and geology. • To invite interest in chemistry and experimentation.
STATES OF MATTER	
Temperature Affects the State of Matter	• To expand on the concept that "colder elements clump together" and "hotter elements spread out" introduced in The Story of Creation.
Solids • Model • Properties	• To give a sensorial impression of the states of matter.
Liquids • Model • Properties • Liquids Take the Shape of their Container	• To give a sensorial impression of the states of matter.
Gases • Model • Properties • Gases Move in all Directions	• To give a sensorial impression of the states of matter.

continues

MONTESSORI LESSONS	PURPOSES
Which Way Do They Push? • Solids Push Down • Liquids Push Sideways and Down • Gases can Push Upwards	• To give a sensorial experience of the interaction of solids with gravity. • To give a sensorial experience of the interaction of liquids with gravity. • To give a sensorial experience of the interaction of gas with gravity.
Attraction and Gravity • Idea of Gravity • Liquids Settle According to their Weight • With Movement, Different Materials Arrange Themselves According to their Weight • Magnetic Forces	• To become familiar with the concept of gravity and its nomenclature. • To experience the effects of gravity on a liquid. • To provide a sensorial impression of some of the forces at work on the early Earth. • To experience the effects of movement and gravity on a solid.
MIDDLE SERIES	
FURTHER STATES OF MATTER	
Temperature Affects the State of Matter (extended)	• To see that matter assumes different states according to its temperature.
Liquids • Fluid, Viscous • Temperature Affects Viscosity	• To demonstrate that not all liquids are alike. • To share the nomenclature “fluid” and “viscous.” • Recognize that the viscosity of a liquid may be affected by heat. • To prepare for understanding plate tectonics.

Solids
• Rigid, Elastic, Plastic
• Solids can be Rigid or Elastic
  • Depending on Length
  • Depending on Thickness
  • Depending on Weight Applied
  • Depending on Location of Weight
	• To realize that solids are not alike.
	• To give nomenclature for types of solids.

ASSESSMENT VOCABULARY

INITIAL SERIES

absorbency
account
best
color
cook
cool (verb)
egg
exist
flexibility
freeze
hardness
heat (verb)
irreversible
leaf
liquid
material (noun)
matter
plant
properties
reversible
solid
substance
temperature
texture
variety

Cognitive Verbs

analyze
build
cause
classify
conduct
construct
depend
describe
determine
disassemble
intend
observe
obtain
plan
reverse
share
test

LATER SERIES

In addition to previous vocabulary:

baking soda
compress
condensation
conserve
converse
cool (verb)
density
detect
dissolve
electrical conductivity
evaporate
evaporation
form (noun)
gas
magnetic force
mass
matter particle
metal
mineral
particle
phase change
physical properties
powder
reaction
reflectivity
response
solubility
space
structure
sugar
thermal conductivity
weight

Cognitive Verbs

define
develop
expand
explain
graph
identify
measure
mix
provide
solve

ASSESSMENT CONSIDERATIONS

INITIAL SERIES

Students will be asked to demonstrate understanding that:

- Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. (2-PS1-1)
- Matter can be described and classified by its observable properties. (2-PS1-1)
- Different properties are suited to different purposes. (2- PS1-2) (2-PS1-3)
- A great variety of objects can be built up from a small set of pieces. (2-PS1-3)
- Heating or cooling a substance may cause changes that can be observed. (2-PS1-4)
- Sometimes these changes caused by heating or cooling are reversible, and sometimes they are not. (2-PS1-4)

LATER SERIES

Students will be asked to demonstrate understanding that:

- Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. (5-PS1-1)
- A model showing that gasses are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1)
- The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)
- Measurements of a variety of properties can be used to identify materials. (5-PS1-3)
- No matter what reaction or change in properties occurs, the total weight of the substances does not change. (5-PS1-2)
- When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)

NEXT GENERATION SCIENCE STANDARDS

PHYSICAL SCIENCE (PS)

MATTER AND ITS INTERACTIONS

2-PS1-1	Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties
2-PS1-2	Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.
2-PS1-3	Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
2-PS1-4	Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.
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.
5-PS1-4	Conduct an investigation to determine whether the mixing of two or more substances results in new substances

NOTES

CHAPTER 2

LIGHT AND SOUND

LIGHT AND SOUND

SKILLS INVENTORY

Lower Elementary

- Demonstrates understanding that sound makes matter vibrate and vibrating matter can make sound.
- Demonstrates understanding that objects can be seen when they are illuminated and the effect of placing objects of different materials in the path of a beam of light.
- Identifies ways in which light and sound are used to communicate over a distance.

Upper Elementary

- Relates waves in water with light and sound waves, identifies amplitude and wavelength and how technology uses these patterns to transfer information.

MONTESSORI LESSONS	PURPOSES
INITIAL SERIES	
Light and Sound Waves • Teacher-Created Lessons	• To experience light sources, mirrors, and shadows. • To understand sound vibrations.
MIDDLE SERIES	
Amplitude and Wavelength • Teacher-Created Lessons	• To understand amplitude (height of the wave). • To understand wavelength (space between wave peaks).
Digitized Information • Teacher-Created Lessons	• To understand computers, cell phones, etc.

ASSESSMENT VOCABULARY

INITIAL SERIES

account
available
beam
communicate
device
external
illuminate
instrumentation
light
light beam
light source
material (noun)
matter
opaque
pinhole box
reflective
shadow
sound
surface
translucent
transparent
tuning fork
variety
vibrate

Cognitive Verbs

allow
build
communicate
conduct
construct
design
determine
plan
provide
receive
solve

MIDDLE SERIES

In addition to previous vocabulary:
amplitude
best
cell phone
coded
computer
convert
criteria
decode
degradation
diagram
digitize
disturb
form (noun)
high-tech
Morse code
net motion
peak
physical model
sound wave
transfer (verb)
transmit
wave
wave peaks
wavelength
wire

Cognitive Verbs

cause
compare
describe
determine
develop
generate
illustrate
optimize
receive
represent
test

ASSESSMENT CONSIDERATIONS

INITIAL SERIES

Students will be asked to demonstrate understanding that:

- Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1)
- Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2)
- Some materials allow light to pass through them, others allow only some light through, and others block all the light and create a dark shadow on any surface beyond them where the light cannot reach. (1-PS4-3)
- Mirrors can be used to redirect a light beam. (1-PS4-3)
- People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)

MIDDLE SERIES

Students will be asked to demonstrate understanding that:

- Waves, which are regular patterns of motion, can be made in water by disturbing the surface. (4-PS4-1)
- When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach. (4-PS4-1)
- Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)
- Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)

NEXT GENERATION SCIENCE STANDARDS

PHYSICAL SCIENCE (PS)

WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER

1-PS4-1	Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate
1-PS4-2	Make observations to construct an evidence-based account that objects can be seen only when illuminated.
1-PS4-3	Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light
1-PS4-4	Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
4-PS4-1	Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
4-PS4-3	Generate and compare multiple solutions that use patterns to transfer information.

NOTES

CHAPTER 3

FORCES AND INTERACTIONS

FORCES AND INTERACTIONS

SKILLS INVENTORY
Lower Elementary Demonstrates understanding of how forces and motions impact an object and the types of interactions between objects with different properties.

MONTESSORI LESSONS	PURPOSES
MIDDLE SERIES	
Force • Teacher-Created Lessons	• To understand that forces act on an object with both strength and direction.
Motion patterns • Teacher-Created Lessons	• To understand that the patterns of an object's motion can be observed, measured, and predicted.
Relationship between objects • Teacher-Created Lessons	• To understand that objects in contact exert forces on each other.
Electric and Magnetic Forces • Teacher-Created Lessons	• Recognize that electric and magnetic forces between a pair of objects do not require that the objects be in contact.

ASSESSMENT VOCABULARY

MIDDLE SERIES

balanced force
charged rod
conceptual
contact
design problem
device
electric
electric force
electrically charged
electromagnet
exert
force
future motion
interaction
magnet
magnetic
magnetic force
magnitude
momentum
net force
orientation
past motion
properties
push
qualitative
relative
rest
roll
situation
speed
sum
swing
typical
unbalanced force

Cognitive Verbs

affect
apply
ask
cause
conduct
construct
create
define
depend
determine
manipulate
measure
observe
plan
predict
produce
provide
solve

ASSESSMENT CONSIDERATIONS

MIDDLE SERIES

Students will be asked to demonstrate understanding that:

Forces and Motion

- Each force acts on one particular object and has both strength and a direction. (3-PS2-1)
- An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. (3-PS2-1)
- Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (3-PS2-1)
- The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (3-PS2-2)

Types of Interactions

- Objects in contact exert forces on each other. (3-PS2-1)
- Electric and magnetic forces between a pair of objects do not require that the objects be in contact. (3-PS2-3), (3-PS2-4)
- The sizes of the forces depend on the properties of the objects and their distances apart (3-PS2-3), (3-PS2-4)
- The sizes of the forces between two magnets depend on their orientation relative to each other. (3-PS2-3), (3-PS2-4)

NEXT GENERATION SCIENCE STANDARDS

PHYSICAL SCIENCE (PS)

MOTION AND STABILITY: FORCES AND INTERACTIONS

3-PS2-1	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
3-PS2-2	Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.
3-PS2-3	Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.
3-PS2-4	Define a simple design problem that can be solved by applying scientific ideas about magnets.

NOTES

CHAPTER 4

ENERGY

ENERGY

SKILLS INVENTORY

Upper Elementary

- Demonstrates understanding that energy can be transferred from place to place by sound, light, heat, and electric currents.
- Demonstrates understanding relating to the speed of an object to the energy of that object and how energy changes when objects collide.

MONTESSORI LESSONS	PURPOSES
LATER SERIES	
Energy • Teacher-Created Lessons	• To understand that energy is present whenever there are moving objects, sound, light, or heat.
Speed • Teacher-Created Lessons	• To understand that the faster an object is moving, the more energy it possesses.
Transfer • Teacher-Created Lessons	• To understand that when objects collide, energy can be transferred from one object to another, thereby changing their motion. • To understand that light transfers energy from place to place. • To understand that when objects collide, the contact forces transfer energy so as to change the objects' motions.
Electrical Currents • Teacher-Created Lessons	• To understand that energy can also be transferred from place to place by electric currents. • To understand that electrical currents produce motion, sound, heat, or light.
Natural Energy Sources • Teacher-Created Lessons	• To understand that energy and fuels that humans use are derived from natural sources. • To understand that human use of natural sources affects the environment in multiple ways. • Recognize that some resources are renewable over time, and others are not.

ASSESSMENT VOCABULARY

MIDDLE SERIES

account
available
burn
collide
collision
conversion
convert
cost
criteria
derive
device
electric circuit
electric current
electrical
electrical energy
environment
environmental
everyday life
feature
fissile
force
form (noun)
fossil fuel
fuel
habitat
heat (noun)
heat (verb)
human
light
limited
local
material (noun)
mining
motion energy
natural resource
nonrenewable energy
passive
pollution
possess
proposal
renewable energy
renewable resource
resource
solar heater
sound
speed
stored energy
success
sunlight
surface mining
surrounding
transfer (verb)
transform
typical
vehicle
wind

Cognitive Verbs

affect
apply
ask
begin
change
combine
compare
consider
construct
describe
design
determine
interact
limit
obtain
predict
present
produce
provide
refine
relate
test

ASSESSMENT CONSIDERATIONS

MIDDLE SERIES

Students will be asked to demonstrate understanding that:

- The faster a given object is moving, the more energy it possesses. (4-PS3-1)
- Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3)
- Energy is present whenever there are moving objects, sound, light, or heat. (4-PS3-2),(4-PS3-3)
- When objects collide, energy can be transferred from one object to another, thereby changing their motion. (4-PS3-2),(4-PS3-3)
- In collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated, and sound is produced. (4-PS3-2),(4-PS3-3)
- Light also transfers energy from place to place. (4-PS3-2)
- Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. (4-PS3-2),(4-PS3-4)
- Currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4-PS3-4)
- When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3-3)
- The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)
- Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. (4-ESS3-1)
- Some resources are renewable over time, and others are not. (4-ESS3-1)

NEXT GENERATION SCIENCE STANDARDS

PHYSICAL SCIENCE (PS)

ENERGY

4-PS3-1	Use evidence to construct an explanation relating the speed of an object to the energy of that object.
4-PS3-2	Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
4-PS3-3	Ask questions and predict outcomes about the changes in energy that occur when objects collide.
4-PS3-4	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

EARTH AND SPACE SCIENCE (ESS)

EARTH AND HUMAN ACTIVITY

4-ESS3-1	Obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment.

NOTES

APPENDIX

ENGINEERING, TECHNOLOGY, AND APPLICATIONS OF SCIENCE

SKILLS INVENTORY
Engages in scientific inquiry to build, deepen, and apply knowledge of science including understanding what scientists do to investigate the natural world and what engineers do to design and build systems.

MONTESSORI LESSONS	PURPOSES
These purposes are integrated into Montessori lessons across the science curriculum.	
Life Science	• To use a model to represent relationships in the natural world. • To use observations to describe patterns in the natural world in order to answer scientific questions. • To construct an argument with evidence to support a claim. • To communicate solutions with others in oral and/or written forms. • To use models and/or drawings that provide detail about scientific ideas.
Physical Science	• To plan and conduct an investigation in collaboration with peers. • To analyze data from tests of an object or tool to determine if it works as intended.
Earth Science	• To use observations to describe patterns in the natural world in order to answer scientific questions. • To construct an argument with evidence to support a claim.

ASSESSMENT VOCABULARY

INITIAL SERIES

analyze
communicate
compare
convey
design (noun)
develop
engineering
illustrate
optimize
physical model
representation
situation
sketch
solve
test

Cognitive Verbs

approach
ask
change
create
define
design
engineer
gather
solve
understand

MIDDLE AND LATER SERIES

In addition to previous vocabulary:

account
aspect
available
best
control (variable)
controlled
cost
criteria
design problem
design process
difficulty
element
failure point
feature
improved
limited
material (noun)
peers
perform
proposal
prototype
resource
success

Cognitive Verbs

carry out
communicate
compare
consider
control
determine
develop
generate
identify
improve
investigate
involve
lead
limit
optimize
plan
propose
share
suggest
test

ASSESSMENT CONSIDERATIONS

INITIAL SERIES

Students will be asked to demonstrate understanding that:

Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)
- Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)
- Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)

Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2)

Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)

Students will be asked to:

Asking Questions and Defining Problems

- Ask questions based on observations to find more information about the natural and/or designed world. (K-2-ETS1-1)
- Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)

Developing and Using Models

- Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)

Analyzing and Interpreting Data

- Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3)

MIDDLE AND LATER SERIES

Students will be asked to demonstrate understanding that:

Defining and Delimiting Engineering Problems

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). (3-5-ETS1-1)
- Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)

Developing Possible Solutions

- Research on a problem should be carried out before beginning to design a solution. (3-5-ETS1-2)
- Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)

Optimizing the Design Solution

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)

NEXT GENERATION SCIENCE STANDARDS

ENGINEERING, TECHNOLOGY AND APPLICATIONS OF SCIENCE (ETS)

ENGINEERING DESIGN

K-2-ETS1-1	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
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.
K-2-ETS1-2	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
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.
K-2-ETS1-3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
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.

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2-PS1-2	Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.	
2-PS1-3	Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.	
2-PS1-4	Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.	
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	
5-PS1-3	heating, cooling, or mixing substances, the total weight of matter is conserved."	
5-PS1-4	Make observations and measurements to identify materials based on their properties.	

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NEXT GENERATION SCIENCE STANDARDS		MONTESSORI CHAPTERS AND SECTIONS
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3-PS2-3	Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.	
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4-PS3-2	Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.	
4-PS3-3	Ask questions and predict outcomes about the changes in energy that occur when objects collide.	
4-PS3-4	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.	

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NEXT GENERATION SCIENCE STANDARDS		MONTESSORI CHAPTERS AND SECTIONS
WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER		
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1-PS4-2	Make observations to construct an evidence-based account that objects can be seen only when illuminated.	
1-PS4-3	Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light	
1-PS4-4	Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.	
4-PS4-1	Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.	
4-PS4-2	Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen	
4-PS4-3	Generate and compare multiple solutions that use patterns to transfer information.	
EARTH AND SPACE SCIENCE (ESS)		
EARTH AND HUMAN ACTIVITY		
4-ESS3-1	Obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment.	**Energy** • Energy

continues

NEXT GENERATION SCIENCE STANDARDS		MONTESSORI CHAPTERS AND SECTIONS
ENGINEERING, TECHNOLOGY, AND APPLICATIONS OF SCIENCE (ETS)		
ENGINEERING DESIGN		
K-2-ETS1-1	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.	**Appendix** • Engineering, Technology, and Applications of Science
K-2-ETS1-2	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem	
K-2-ETS1-3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs	
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.	
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.	
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.	

MONTESSORI TO STANDARDS INDEX

MONTESSORI CHAPTER AND SECTION	NEXT GENERATION SCIENCE STANDARDS ALIGNED	
MATTER AND LAWS		
Matter and its Interactions	**PS**	**Physical Science** • Matter and its Interactions
LIGHT AND SOUND WAVES		
Light and Sound Waves	**PS**	**Physical Science** • Waves and their Applications in Technologies for Information Transfer
FORCES AND INTERACTIONS		
Forces and Interactions	**PS**	**Physical Science** • Motion and Stability: Forces and Interactions
ENERGY		
Energy	**PS**	**Physical Science** • Energy
	ESS	**Earth and Space Science** • Earth and Human Activity
APPENDIX		
Engineering, Technology, and Applications of Science	**ETS**	**Engineering, Technology, and Applications of Science** • Engineering Design