



Zula Exploration Mission Modules
Alignment with Michigan Grade Level Content Expectations

Legend

SM = Simple Machines Exploration Mission Module

MSCR = Mixtures, Solutions, and Chemical Reactions Exploration Mission Module

FR = Force Exploration Mission Module

HB = Habitats Exploration Mission Module

MA = Matter Exploration Mission Module

LT = Light Exploration Mission Module

H₂O = Water Exploration Mission Module

PALC = Plants, Animals, and Life Cycles Mission Module

All = All current and future Zula activities and lesson plans

FK = Future Mission Exploration Modules

SCIENCE - KINDERGARTEN

Science Processes

Inquiry Process

S.IP.E.1 Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation.

S.IP.00.11 Make purposeful observation of the natural world using the appropriate senses. **ALL**

S.IP.00.12 Generate questions based on observations. **ALL**

S.IP.00.13 Plan and conduct simple investigations. **ALL**

S.IP.00.14 Manipulate simple tools (for example: hand lens, pencils, balances, non-standard objects for measurement) that aid observation and data collection. **ALL**

S.IP.00.15 Make accurate measurements with appropriate (non-standard) units for the measurement tool. **ALL**

S.IP.00.16 Construct simple charts from data and observations. **ALL**

Inquiry Analysis and Communication

S.IA.E.1 Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations.

S.IA.00.12 Share ideas about science through purposeful conversation. **ALL**

S.IA.00.13 Communicate and present findings of observations. **ALL**

S.IA.00.14 Develop strategies for information gathering (ask an expert, use a book, make observations, conduct simple investigations, and watch a video). **ALL**

Reflection and Social Implications

S.RS.E.1 Reflecting on knowledge is the application of scientific knowledge to new and different situations. Reflecting on knowledge requires careful analysis of evidence that guides decision making and the application of science throughout history and within society.

S.RS.00.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities. **ALL**

Science Processes

Force and Motion

P.FM.E.1 Position- A position of an object can be described by locating the object relative to other objects or a background. The description of the motion of an object from one observer's view may be different from that reported from a different observer's view.

P.FM.00.11 Compare the position of an object (for example: above, below, in front of, behind, on) in relation to other objects around it. **SM, FK**

P.FM.00.12 Describe the motion of an object (for example: away from or closer to) from different observers' views. **SM, FR, FK**

P.FM.E.2 Gravity- Earth pulls down on all objects with a force called gravity. With very few exceptions, objects fall to the ground no matter where the object is on the Earth.

P.FM.00.21 Observe how objects fall toward the earth. **FK**

P.FM.E.3 Force- A force is either a push or a pull. The motion of objects can be changed by forces. The size of the change is related to the size of the force. The change is also related to the weight (mass) of the object on which the force is being exerted. When an object does not move in response to a force, it is because another force is being applied by the environment.

P.FM.00.31 Demonstrate pushes and pulls. **FR**

P.FM.00.32 Observe that objects initially at rest will move in the direction of the push or pull. **FR**

P.FM.00.33 Observe how pushes and pulls can change the speed or direction of moving objects. **FR**

P.FM.00.34 Observe how shape (for example: cone, cylinder, sphere), size, and weight of an object can affect motion. **SM, FR, FK**

Life Science

Organization of Living Things

L.OL.E.1 Life Requirements- Organisms have basic needs. Animals and plants need air, water, and food. Plants also require light. Plants and animals use food as a source of energy and as a source of building material for growth and repair.

L.OL.00.11 Identify that living things have basic needs. **PALC, HB, FK**

L.OL.00.12 Identify and compare living and nonliving things. **PALC, FK**

Earth Science

Solid Earth

E.SE.E.1 Earth Materials - Earth materials that occur in nature include rocks, minerals, soils, water, and the gases of the atmosphere. Some Earth materials have properties which sustain plant and animal life.

E.SE.00.11 Identify Earth materials (air, water, soil) that are used to grow plants. **PALC, HB, FK**

SCIENCE – FIRST GRADE

Science Processes

Inquiry Process

S.IP.E.1 Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation.

S.IP.01.11 Make purposeful observation of the natural world using the appropriate senses. **ALL**

S.IP.01.12 Generate questions based on observations. **ALL**

S.IP.01.13 Plan and conduct simple investigations. **ALL**

S.IP.01.14 Manipulate simple tools (for example: hand lens, pencils, rulers, thermometers, rain gauges, balances, non-standard objects for measurement) that aid observation and data collection. **ALL**

S.IP.01.15 Make accurate measurements with appropriate (non-standard) units for the measurement tool. **ALL**

S.IP.01.16 Construct simple charts from data and observations. **ALL**

Inquiry Analysis and Communication

S.IA.E.1 Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations.

S.IA.01.12 Share ideas about science through purposeful conversation. **ALL**

S.IA.01.13 Communicate and present findings of observations. **ALL**

S.IA.01.14 Develop strategies for information gathering (ask an expert, use a book, make observations, conduct simple investigations, and watch a video). **ALL**

Reflection and Social Implications

S.RS.E.1 Reflecting on knowledge is the application of scientific knowledge to new and different situations. Reflecting on knowledge requires careful analysis of evidence that guides decision-making and the application of science throughout history.

S.RS.01.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities. **ALL**

S.RS.01.12 Recognize that science investigations are done more than one time. **ALL**

Physical Science

Properties of Matter

P.PM.E.1 Physical Properties- All objects and substances have physical properties that can be measured.

P.PM.01.11 Demonstrate the ability to sort objects according to observable attributes such as color, shape, size, sinking or floating. **H2O, SM, MSCR, FK**

P.PM.E.2 States of Matter- Matter exists in several different states: solids, liquids and gases. Each state of matter has unique physical properties. Gases are easily compressed but liquids and solids do not compress easily. Solids have their own particular shapes, but liquids and gases take the shape of the container.

- P.PM.01.21** Demonstrate that water as a solid keeps its own shape (ice). **MA, H2O, FK**
- P.PM.01.22** Demonstrate that water as a liquid takes on the shape of various containers. **MA, H2O, FK**
- P.PM.E.3** Magnets- Magnets can repel or attract other magnets. Magnets can also attract certain non-magnetic objects at a distance.
- P.PM.01.31** Identify materials that are attracted by magnets. **FK**
- P.PM.01.32** Observe that like poles of a magnet repel and unlike poles of a magnet attract. **FK**

Life Science

Organization of Living Things

- L.OL.E.1** Life Requirements- Organisms have basic needs. Animals and plants need air, water, and food. Plants also require light. Plants and animals use food as a source of energy and as a source of building material for growth and repair.
- L.OL.01.13** Identify the needs of animals. **PALC, HB, FK**
- L.OL.E.2** Life Cycles- Plants and animals have life cycles. Both plants and animals begin life and develop into adults, reproduce, and eventually die. The details of this life cycle are different for different organisms.
- L.OL.01.21** Describe the life cycle of animals including the following stages: egg, young, adult; egg, larva, pupa, adult. **PALC, FK**

Heredity

- L.HE.E.1** Observable Characteristics- Plants and animals share many, but not all, characteristics of their parents.
- L.HE.01.11** Identify characteristics (for example: body coverings, beak shape, number of legs, body parts) that are passed on from parents to young. **PALC, FK**
- L.HE.01.12** Classify young animals based on characteristics that are passed on from parents (for example: dogs/puppies, cats/kittens, cows/calves, chicken/chicks). **PALC, FK**

Earth Science

Earth Systems

- E.ES.E.1** Solar Energy- The sun warms the land, air and water and helps plants grow.
- E.ES.01.11** Identify the sun as the most important source of heat which warms the land, air, and water of the Earth. **FK**
- E.ES.01.12** Demonstrate the importance of sunlight and warmth in plant growth. **PALC, FK**
- E.ES.E.2** Weather- Weather changes from day to day and over the seasons.
- E.ES.01.21** Compare daily changes in the weather related to temperature (cold, hot, warm, cool); cloud cover (cloudy, partly cloudy, foggy) precipitation (rain, snow, hail, freezing rain); wind (breezy, windy, calm). **FK**
- E.ES.01.22** Describe and compare weather related to the four seasons in terms of temperature, cloud cover, precipitation, and wind. **FK**
- E.ES.01.23** Describe severe weather events. **FK**
- E.ES.01.24** Describe precautions that should be taken for human safety during severe weather conditions (thunderstorms, lightning, tornadoes, high winds, blizzards, hurricanes). **FK**
- E.ES.E.3** Weather Measurement- Scientists use tools for observing, recording, and predicting weather changes.
- E.ES.01.31** Identify the tools that might be used to measure temperature, precipitation, cloud cover and wind. **FK**
- E.ES.01.32** Observe and collect data of weather conditions over a period of time. **FK**

Solid Earth

E.SE.E.1 Earth Materials- Earth materials that occur in nature include rocks, minerals, soils, water, and the gases of the atmosphere. Some Earth materials have properties which sustain plant and animal life.

E.SE.01.12 Describe how Earth materials contribute to the growth of plant and animal life. **HB, FK**

SCIENCE – SECOND GRADE

Science Processes

Inquiry Process

S.IP.E.1 Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation.

S.IP.02.11 Make purposeful observation of the natural world using the appropriate senses. **ALL**

S.IP.02.12 Generate questions based on observations. **ALL**

S.IP.02.13 Plan and conduct simple investigations. **ALL**

S.IP.02.14 Manipulate simple tools (ruler, meter stick, measuring cups, hand lens, thermometer, balance) that aid observation and data collection. **ALL**

S.IP.02.15 Make accurate measurements with appropriate units (meter, centimeter) for the measurement tool. **ALL**

S.IP.02.16 Construct simple charts and graphs from data and observations. **ALL**

Inquiry Analysis and Communication

S.IA.E.1 Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations.

S.IA.02.12 Share ideas about science through purposeful conversation. **ALL**

S.IA.02.13 Communicate and present findings of observations. **ALL**

S.IA.02.14 Develop strategies and skills for information gathering and problem solving (books, internet, ask an expert, observation, investigation, technology tools). **ALL**

Reflection and Social Implications

S.RS.E.1 Reflecting on knowledge is the application of scientific knowledge to new and different situations. Reflecting on knowledge requires careful analysis of evidence that guides decision-making and the application of science throughout history and within society.

S.RS.02.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities. **ALL**

S.RS.02.13 Recognize that when a science investigation is done the way it was done before, similar results are expected. **ALL**

S.RS.02.15 Use evidence when communicating scientific ideas. **ALL**

S.RS.02.16 Identify technology used in everyday life. **ALL**

Physical Science

Properties of Matter

P.PM.E.1 Physical Properties- All objects and substances have physical properties that can be measured.

P.PM.02.12 Describe objects and substances according to their properties (color, size, shape, texture, hardness, liquid or solid, sinking or floating). **H2O, SM, MSCR, FK**

P.PM.02.13 Measure the length of objects using rulers (centimeters) and meter sticks (meters). **SM, FK**

P.PM.02.14 Measure the volume of liquids using common measuring tools (graduated measuring cups, measuring spoons, graduated cylinders, and beakers). * **MSCR, H2O, FK**

P.PM.02.15 Compare the weight of objects using balances. **SM, FK**

P.PM.E.4 Material Composition- Some objects are composed of a single substance, while other objects are composed of more than one substance.

P.PM.02.41 Recognize that some objects are composed of a single substance (water, sugar, salt) and others are composed of more than one substance (salt and pepper, mixed dry beans). * **MSCR, FK**

Life Science

Organization of Living Things

L.OL.E.1 Life Requirements- Organisms have basic needs. Animals and plants need air, water, and food. Plants also require light. Plants and animals use food as a source of energy and as a source of building material for growth and repair.

L.OL.02.14 Identify the needs of plants. **PALC, HB FK**

L.OL.E.2 Life Cycles- Plants and animals have life cycles. Both plants and animals begin life and develop into adults, reproduce, and eventually die. The details of this life cycle are different for different organisms.

L.OL.02.22 Describe the life cycle of familiar flowering plants including the following stages: seed, plant, flower, and fruit. **PALC, FK**

Heredity

L.HE.E.1 Observable Characteristics- Plants and animals share many, but not all, characteristics of their parents.

L.HE.02.13 Identify characteristics of plants (for example: leaf shape, flower type, color, size) that are passed on from parents to young. **PALC, FK**

Earth Science

Solid Earth

E.SE.E.2 Surface Changes- The surface of Earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.

E.SE.02.21 Describe the major landforms of the surface of the Earth (mountains, plains, plateaus, valleys, hills). **FK**

Fluid Earth

E.FE.E.1 Water- Water is a natural resource and is found under the ground, on the surface of the Earth, and in the sky. It exists in three states (liquid, solid, gas) and can go back and forth from one form to another.

E.FE.02.11 Identify water sources (wells, springs, lakes, rivers, oceans). **H2O, FK**

E.FE.02.12 Identify household uses of water (drinking, cleaning, food preparation). **H2O, FK**

E.FE.02.13 Describe the properties of water as a liquid (visible, flowing, shape of container and recognize rain, dew, and fog as water in its liquid state). * **MA, FK**

E.FE.02.14 Describe the properties of water as a solid (hard, visible, frozen, cold) and recognize ice, snow, and hail as water in its solid state. * **MA, FK**

E.FE.E.2 Water Movement- Water moves in predictable patterns.

E.FE.02.21 Describe how rain collects on the surface of the Earth and flows downhill into bodies of water (streams, rivers, lakes, oceans) or into the ground. **FK**

E.FE.02.22 Describe the major bodies of water on the Earth's surface (lakes, ponds, oceans, rivers, streams). **H2O, FK**

SCIENCE – THIRD GRADE

Science Processes

Inquiry Process

S.IP.E.1 Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation.

S.IP.03.11 Make purposeful observation of the natural world using the appropriate senses. **ALL**

S.IP.03.12 Generate questions based on observations. **ALL**

S.IP.03.13 Plan and conduct simple and fair investigations. **ALL**

S.IP.03.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer). **ALL**

S.IP.03.15 Make accurate measurements with appropriate units (centimeters, meters, Celsius, grams, seconds, minutes) for the measurement tool. **ALL**

S.IP.03.16 Construct simple charts and graphs from data and observations. **ALL**

Inquiry Analysis and Communication

S.IA.E.1 Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations.

S.IA.03.11 Summarize information from charts and graphs to answer scientific questions. **ALL**

S.IA.03.12 Share ideas about science through purposeful conversation in collaborative groups. **ALL**

S.IA.03.13 Communicate and present findings of observations and investigations. **ALL**

S.IA.03.14 Develop research strategies and skills for information gathering and problem solving. **ALL**

S.IA.03.15 Compare and contrast sets of data from multiple trials of a science investigation to explain reasons for differences. **ALL**

Reflection and Social Implications

S.RS.E.1 Reflecting on knowledge is the application of scientific knowledge to new and different situations. Reflecting on knowledge requires careful analysis of evidence that guides decision-making and the application of science throughout history and within society.

S.RS.03.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities. **ALL**

S.RS.03.14 Use data/samples as evidence to separate fact from opinion. **ALL**

S.RS.03.15 Use evidence when communicating scientific ideas. **ALL**

S.RS.03.16 Identify technology used in everyday life. **ALL**

S.RS.03.17 Identify current problems that may be solved through the use of technology. **ALL**

S.RS.03.18 Describe the effect humans and other organisms have on the balance of the natural world. **FK**

Physical Science

Force and Motion

P.FM.E.2 Gravity- Earth pulls down on all objects with a force called gravity. With very few exceptions, objects fall to the ground no matter where the object is on the Earth.

P.FM.03.22 Identify the force that pulls objects towards the Earth. **FK**

P.FM.E.3 Force- A force is either a push or a pull. The motion of objects can be changed by forces. The size of the change is related to the size of the force. The change is also related to the weight (mass) of the object on which the force is being exerted. When an object does not move in response to a force, it is because another force is being applied by the environment.

- P.FM.03.35** Describe how a push or a pull is a force. **FR**
- P.FM.03.36** Relate a change in motion of an object to the force that caused the change of motion. **FR**
- P.FM.03.37** Demonstrate how the change in motion of an object is related to the strength of the force acting upon the object and to the mass of the object. **FR**
- P.FM.03.38** Demonstrate when an object does not move in response to a force, it is because another force is acting on it. **FR**
- P.FM.E.4** Speed- An object is in motion when its position is changing. The speed of an object is defined by how far it travels in a standard amount of time. *
- P.FM.03.41** Describe the motion of objects in terms of direction. * **SM, FR**
- P.FM.03.42** Identify changes in motion (change direction, speeding up, slowing down). **SM, FR**
- P.FM.03.43** Relate the speed of an object to the distance it travels in a standard amount of time. **FR**

Energy

- P.EN.E.1** Forms of Energy- Heat, electricity, light, and sound are forms of energy.
- P.EN.03.11** Identify light and sound as forms of energy. **LT, FK**
- P.EN.E.2** Light Properties- Light travels in a straight path. Shadows result from light not being able to pass through an object. When light travels at an angle from one substance to another (air and water), it changes direction. *
- P.EN.03.21** Demonstrate that light travels in a straight path and that shadows are made by placing an object in a path of light. * **LT**
- P.EN.03.22** Observe what happens to light when it travels from air to water (a straw half in the water and half in the air looks bent). * **LT**
- P.EN.E.3** Sound- Vibrating objects produce sound. The pitch of sound varies by changing the rate of vibration.
- P.EN.03.31** Relate sounds to their sources of vibrations (for example: a musical note produced by a vibrating guitar string, the sounds of a drum made by the vibrating drum head). **FK**
- P.EN.03.32** Distinguish the effect of fast or slow vibrations as pitch. **FK**

Properties of Matter

- P.PM.E.5** Conductive and Reflective Properties- Objects vary to the extent they absorb and reflect light energy and conduct heat and electricity.
- P.PM.03.51** Demonstrate how some materials are heated more than others by light that shines on them. **LT**
- P.PM.03.52** Explain how we need light to see objects: light from a source reflects off objects and enters our eyes. **FK**

Life Science

Organization of Living Things

- L.OL.E.3** Structures and Functions- Organisms have different structures that serve different functions in growth, survival, and reproduction.
- L.OL.03.31** Describe the function of the following plant parts: flower, stem, root, and leaf. **PALC, FK**
- L.OL.03.32** Identify and compare structures in animals used for controlling body temperature, support, movement, food-getting, and protection (for example: fur, wings, teeth, scales). * **FK**
- L.OL.E.4** Classification- Organisms can be classified on the basis of observable characteristics.
- L.OL.03.41** Classify plants on the basis of observable physical characteristics (roots, leaves, stems, and flowers). **PALC, FK**
- L.OL.03.42** Classify animals on the basis of observable physical characteristics (backbone, body coverings, limbs). * **PALC, HB, FK**

Evolution

L.EV.E.1 Environmental Adaptation- Different kinds of organisms have characteristics that help them to live in different environments.

L.EV.03.11 Relate characteristics and functions of observable parts in a variety of plants that allow them to live in their environment (leaf shape, thorns, odor, color). * **PALC, FK**

L.EV.03.12 Relate characteristics and functions of observable body parts to the ability of animals to live in their environment (sharp teeth, claws, color, body coverings). * **PALC, HB, FK**

Earth Science

Earth Systems

E.ES.E.4 Natural Resources- The supply of many natural resources is limited. Humans have devised methods for extending their use of natural resources through recycling, reuse, and renewal.

E.ES.03.41 Identify natural resources (metals, fuels, fresh water, fertile soil, and forests). * **FK**

E.ES.03.42 Classify renewable (fresh water, fertile soil, forests) and non-renewable (fuels, metals) resources. * **FK**

E.ES.03.43 Describe ways humans are protecting, extending, and restoring resources (recycle, reuse, reduce, renewal). **FK**

E.ES.03.44 Recognize that paper, metal, glass, and some plastics can be recycled. **FK**

E.ES.E.5 Human Impact- Humans depend on their natural and constructed environment. Humans change environments in ways that are helpful or harmful for themselves and other organisms.

E.ES.03.51 Describe ways humans are dependent on the natural environment (forests, water, clean air, Earth materials) and constructed environments (homes, neighborhoods, shopping malls, factories, and industry). **FK**

E.ES.03.52 Describe helpful or harmful effects of humans on the environment (garbage, habitat destruction, land management, renewable, and non-renewable resources). **FK**

Solid Earth

E.SE.E.1 Earth Materials- Earth materials that occur in nature include rocks, minerals, soils, water, and the gases of the atmosphere. Some Earth materials have properties which sustain plant and animal life.

E.SE.03.13 Recognize and describe different types of Earth materials (mineral, rock, clay, boulder, gravel, sand, soil, water, and air). * **FK**

E.SE.03.14 Recognize that rocks are made up of minerals. **FK**

E.SE.E.2 Surface Changes - The surface of Earth changes. Some changes are due to slow processes, such as erosion and weathering; and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.

E.SE.03.22 Identify and describe natural causes of change in the Earth's surface (erosion, glaciers, volcanoes, landslides, and earthquakes). **FK**

E.SE.E.3 Using Earth Materials- Some Earth materials have properties that make them useful either in their present form or designed and modified to solve human problems. They can enhance the quality of life as in the case of materials used for building or fuels used for heating and transportation.

E.SE.03.31 Identify Earth materials used to construct some common objects (bricks, buildings, roads, glass). * **FK**

E.SE.03.32 Describe how materials taken from the Earth can be used as fuels for heating and transportation. **FK**