Participation, Supported Independence, and Functional Independence
Science Extended Benchmarks (EBs)

FINAL VERSION 9/17/07

STRAND 3: USING LIFE SCIENCE KNOWLEDGE

Background Information: The science benchmarks in this document are taken from the Michigan Curriculum Framework Science Content Benchmarks, 2000 version (MCF v.2000). These benchmarks have been extended for the MI-Access Functional Independence, Supported Independence, and Participation populations, and are presented in this document. The coding keys below explain abbreviations found throughout the document, including the benchmark and extended benchmark codes. If a cell contains **N/A**, the MCF v.2000 Benchmark was determined to be inappropriate to extend for the population and/or grade span by the MI-Access Science Assessment Plan Writing Team.

MCF v.2000 Science Elementary, Middle School, and High School (Grades K-12) Benchmark Organization				
STRAND 1 **Constructing New Scientific Knowledge** **(C)**	**STRAND 2** **Reflecting on Scientific Knowledge** **(R)**	**STRAND 3** **Using Life Science Knowledge** **(L)**	**STRAND 4** **Using Physical Science Knowledge** **(P)**	**STRAND 5** **Using Earth Science Knowledge** **(E)**
Standards				
CN: Constructing New Scientific Knowledge	RO: Reflecting on Scientific Knowledge	CE: Cells OR: Organization of Living Things HE: Heredity EV: Evolution EC: Ecosystems	ME: Matter and Energy CM: Changes in Matter MO: Motion of Objects WV: Waves and Vibrations	GE: Geosphere HY: Hydrosphere AW: Atmosphere and Weather SS: Solar System, Galaxy, and Universe

Extended Benchmark Coding Examples			
Extended Benchmark: L.CE.FI.EB.III.1.m.1a		**Extended Benchmark: L.CE.SI.EB.III.1.m.1ADDe**	
L	Using Life Science Knowledge	L	Using Life Science Knowledge
CE	Cells	CE	Cells
FI	Functional Independence	SI	Supported Independence
EB	Extended Benchmark	EB	Extended Benchmark
III.1.m.1	MCF v.2000 Benchmark	III.1.m.1	MCF v.2000 Benchmark
a	First Extended Benchmark in this document linked to MCF v.2000 Benchmark III.1.m.1	ADDe	This Extended Benchmark is linked to a middle school MCF v.2000 Benchmark (III.1.m.1) but has been added to elementary school.

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: CELLS (CE)
All students will apply an understanding of cells to the functioning of multi-cellular organisms, including how cells grow, develop and reproduce.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	Elementary School	Middle School	High School
MCF v.2000 Science Benchmark	**None**	**III.1.m.1** Demonstrate evidence that all parts of living things are made of cells. *Key concepts:* Types of living things: plants, animals; parts of organisms: tissues, organs, organ systems; all functions of organisms are carried out by cells. See LC-III.1 m.2 for specific functions. *Tools*: Hand lens, microscope. *Real-world contexts:* Common plant or animal cells: Elodea leaf cells, onion skin cells, human cheek cells. Single-celled organisms: Paramecium.	**III.1.h.1** Explain how multi-cellular organisms grow, based on how cells grow and reproduce. *Key concepts:* Specialized functions of cells—respiration (see LO h.3), protein synthesis, mitosis, meiosis (see LH-III.3 h.2). Basic molecules for cell growth—simple sugars, amino acids, fatty acids. Basic chemicals, molecules and atoms—water, minerals, carbohydrates, proteins, fats and lipids, nucleic acids; carbon, hydrogen, oxygen, nitrogen. Cells come only from other cells. See LO m.4 (digestion). *Real-world contexts:* The growth of plants and animals.
Functional Independence Extended Benchmark Classroom/LEA/ISD and State	**N/A**	**L.CE.FI.EB.III.1.m.1a** Recognize that all living things are made of cells: some consist of a single cell and some are multi-cellular. *Key concepts:* Differentiate between animal/plant cells by shape (existence of cell wall); single-cell organisms vs. multi-cellular organisms. *Real-world contexts:* Onion skin cell vs. cheek cell; paramecium vs. human.	**L.CE.FI.EB.III.1.h.1a** Recognize that multi-cellular organisms grow and reproduce. *Key concepts:* Cells come only from like cells. *Real-world contexts:* Cell reproduction is part of growth— the need for hair cuts. Hair cells only produce hair cells. Leaf cells only produce leaf cells.

Supported Independence Extended Benchmark Classroom/LEA/ISD and State	**L.CE.SI.EB.III.1.m.1ADDe** Discriminate between living and non-living things. *Key concepts:* Living and non-living things. *Real-world contexts:* Familiar objects, such as toys vs. people, toys vs. animals.	**L.CE.SI.EB.III.1.m.1a** Discriminate between living and non-living things. *Key concepts:* Living and non-living things. *Real-world contexts:* Environmental context, such as mailbox vs. tree, playground vs. flower, vehicles.	**L.CE.SI.EB.III.1.h.1a** Identify characteristics of all living things. *Key concepts:* Needs of living things—grow, need food, need water. *Real-world contexts:* Grow, need food, need water, such as in personal care, pet care, lawn care.
Participation Extended Benchmark Classroom/LEA/ISD and State	**L.CE.P.EB.III.1.m.1ADDe** Discriminate between living and non-living things. *Key concepts:* Living—drinking and eating. *Real-world contexts:* Familiar objects, such as toys vs. people, toys vs. animals.	**L.CE.P.EB.III.1.m.1a** Discriminate between living and non-living things. *Key concepts:* Living vs. non-living—drinking and eating. *Real-world contexts:* Does the table want a drink? What would eat; a book or a person?	**L.CE.P.EB.III.1.h.1a** Identify characteristics of all living things. *Key concepts:* Needs of living things—grow, need food, need water. *Real-world contexts:* Personal care, pet care.

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: CELLS (CE)
All students will apply an understanding of cells to the functioning of multi-cellular organisms, including how cells grow, develop and reproduce.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	Elementary School	Middle School	High School
MCF v.2000 Science Benchmark	**None**	**III.1.m.2** Explain why and how selected specialized cells are needed by plants and animals. *Key concepts:* Specialized functions of cells—reproduction, photosynthesis, transport, movement, disease-fighting. See LO m.4 (systems and processes functioning to provide/remove materials to/from cells). *Real-world contexts:* Specialized animal cells: red blood cells, white blood cells, muscle cells, bone cells, nerve cells, egg/sperm cells; specialized plant cells—root cells, leaf cells, stem cells.	**III.1.h.2** Compare and contrast ways in which selected cells are specialized to carry out particular life functions. *Key concepts:* Classifications of organisms by cell type—plant, animal, bacteria; selected specialized plant and animal cells—red blood cells, white blood cells, muscle cells, nerve cells, root cells, leaf cells, stem cells; cell parts used for classification — organelle, nucleus, cell wall, cell membrane; specialized functions — reproduction (see LC-III.1h.1, LH-III.3 h.2), photosynthesis (see LO m.3), transport; cell shape. *Tools:* Microscopes *Real-world contexts:* Reproduction, growth, response, movement, etc. of animals and plants. Functions of bacteria.
Functional Independence Extended Benchmark Classroom/LEA/ISD	**N/A**	**L.CE.FI.EB.III.1.m.2a** Identify that plants and animals have specialized cells. *Key concepts:* Animal reproduction cells and plant reproductive cells, skin cells, blood cells, root cells, and leaf cells. *Real-world contexts:* Red blood cells/white blood cells, sperm cells, egg cells.	**L.CE.FI.EB.III.1.h.2a** Recognize that plants and animals have specialized cells that carry out specific life functions. *Key concepts:* Classification of cells by cell type. *Real-world contexts:* Functions of specific cells, that is, reproductive cells only deal with reproduction.
Supported Independence Extended Benchmark	**N/A**	**N/A**	**N/A**

Participation Extended Benchmark	**N/A**	**N/A**	**N/A**

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: ORGANIZATION OF LIVING THINGS (OR)
All students will use classification systems to describe groups of living things.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	Elementary School	Middle School	High School
MCF v.2000 Science Benchmark	**III.2.e.1** Explain characteristics and functions of observable body parts in a variety of animals. *Key concepts:* Observable characteristics—fur, scales, feathers, horns, claws, eyes, quills, beaks, teeth, skeleton, muscles, exoskeleton; functions— insulation, support, movement, food-getting, protection. *Real-world contexts:* Vertebrate and invertebrate animals, such as humans, cows, sparrows, goldfish, spiders, crayfish, insects.	**None**	**None**
Functional Independence Extended Benchmark Classroom/LEA/ISD and State	**L.OR.FI.EB.III.2.e.1a** Identify characteristics of observable body parts in a variety of animals. *Key concepts:* Observable characteristics—fur, scales, feathers, horns, claws, beaks, teeth. *Real-world contexts:* Pets, farm animals.	**L.OR.FI.EB.III.2.e.1ADDm** Identify characteristics and/or functions of observable body parts in a variety of animals. *Key concepts:* Observable characteristics—fur, scales, feathers, horns, claws, beaks, teeth, skeleton, muscles; functions—insulation, support, movement, food-getting, protection. *Real-world contexts:* Caring for pets, health care, visiting the dentist.	**L.OR.FI.EB.III.2.e.1ADDh** Identify specific variations of observable body parts in a variety of animals. *Key concepts:* Woodpecker and duck—webbed feet, talons, claws. *Real-world contexts:* Bird watching, personal safety.
Supported Independence Extended Benchmark Classroom/LEA/ISD and State	**L.OR.SI.EB.III.2.e.1a** Identify sounds and/or characteristics of animals. *Key concepts:* Observable characteristics—dog and cat (dog—bark, four legs, tail; cat—meow, four legs, tail); soft/hard, big/little. *Real-world contexts:* Bringing in pets, visiting a pet store.	**L.OR.SI.EB.III.2.e.1ADDm** Identify observable characteristics of animals. *Key concepts:* Observable characteristics—pigs, cows, sheep, chickens (fur, feathers, beaks, claws, wings, teeth, fins). *Real-world contexts:* Bringing in pets; visiting a pet store, working farm, or zoo.	**L.OR.SI.EB.III.2.e.1ADDh** Identify observable characteristics of animals. *Key concepts:* Observable characteristics—farm, pets, wild birds, fish, insects. *Real-world contexts:* Visiting a pet store, working farm, zoo, or butterfly house.

Participation Extended Benchmark Classroom/LEA/ISD and State	**L.OR.P.EB.III.2.e.1a** Identify observable characteristics and/or body parts of a variety of animals. *Key concepts:* Observable characteristics—mouth, tail. *Real-world contexts:* Bringing in pets; visiting a pet store, working farm, or zoo.	**L.OR.P.EB.III.2.e.1ADDm** Identify observable characteristics and/or body parts of a variety of animals. *Key concepts:* Observable characteristics—mouth, tail, fur feathers, head, torso. *Real-world contexts:* Bringing in pets; visiting a pet store, working farm, or zoo.	**L.OR.P.EB.III.2.e.1ADDh** Identify observable characteristics and/or body parts of a variety of animals. *Key concepts:* Observable characteristics—mouth, tail, fur feathers, teeth, nails/claws. *Real-world contexts:* Visiting a pet store or working farm.

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: ORGANIZATION OF LIVING THINGS (OR)
All students will use classification systems to describe groups of living things.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	Elementary School	Middle School	High School
MCF v.2000 Science Benchmark	**III.2.e.2** Compare and contrast (K-2) or classify (3-5) familiar organisms on the basis of observable physical characteristics. *Key concepts:* Plant and animal parts—backbone, skin, shell, limbs, roots, leaves, stems, flowers, feathers, scales. *Real-world contexts:* Animals that look similar— snakes, worms, millipedes; flowering and non-flowering plants; pine tree, oak tree, rose, algae.	**III.2.m.1** Compare and classify organisms into major groups on the basis of their structure. *Key concepts:* Characteristics used for classification—vertebrates/ invertebrates, cold-blooded/warm-blooded, single cell/multi-cellular, flowering/non-flowering; groups of vertebrates—mammals, birds, fish, reptiles, amphibians. *Observation tools*: Hand lens, microscope. *Real-world contexts:* Representative organisms, such as dog, worm, snake, Amoeba, geranium, bacterium, insect, mold.	**III.2.h.1** Classify major groups of organisms to the kingdom level. *Key concepts:* Kingdom categories—protist, fungi, moneran, animal, plant. Characteristics for classification—cell wall, cell membrane, organelle, single-celled, multi-cellular. *Real-world contexts:* Common local representatives of each of the five major kingdoms—Paramecium, yeast, mushroom, bacteria, frog, geranium.
Functional Independence Extended Benchmark Classroom/LEA/ISD and State	**L.OR.FI.EB.III.2.e.2a** Identify observable physical characteristics that distinguish plants from animals. *Key concepts:* Plant parts—roots, leaves, stems, flowers; animal parts—legs and arms, feathers, scales, fur. *Real-world contexts:* Choosing a pet, visiting a zoo, school garden, fishing.	**L.OR.FI.EB.III.2.m.1a** Compare and/or classify organisms in major groups based on their structure. *Key concepts:* Characteristics used for classification—reptiles/ mammals, flowering plant vs. non-flowering plant. *Real-world contexts:* Visiting a zoo, school garden, fishing.	**L.OR.FI.EB.III.2.h.1a** Compare and/or classify organisms in major groups based on their structure. *Key concepts:* Characteristics used for classification—reptiles/ mammals, within reptiles; flowering plant vs. non-flowering plant. *Real-world contexts:* Gardening, landscaping.
Supported Independence Extended Benchmark Classroom/LEA/ISD and State	**L.OR.SI.EB.III.2.e.2a** Differentiate between plants and animals. *Key concepts:* Flower, bush, tree, dog, cat, fish. *Real-world contexts:* Nature walk, playing in the yard, going to the park.	**L.OR.SI.EB.III.2.m.1a** Identify the characteristics or parts that distinguish selected plants from animals. *Key concepts:* Tree—roots and leaves, flower—stem and petal, cat—fur and whiskers, dog—legs and tail, fish—fin. *Real-world contexts:* Nature walk, school garden, visiting a pet store, family pets.	**L.OR.SI.EB.III.2.h.1a** Identify the differences between characteristics or parts of plants and animals. *Key concepts:* Structures—animals have legs, plants have roots; animals have skin or exoskeletons, plants have leaves or bark; plants also have stems, seeds, and flowers, animals do not; animals have senses of smell and sight, plants do not. Activities—animals move, plants do not. *Real-world contexts:* Visiting a working farm or horticultural center.

Participation Extended Benchmark Classroom/LEA/ISD and State	**L.OR.P.EB.III.2.e.2a** Identify plants and animals. *Key concepts:* Flowers, trees, grass, pets. *Real-world contexts:* Nature walk, playing in the yard, going to the park, visiting a pet store, family or classroom pets.	**L.OR.P.EB.III.2.m.1a** Identify plants and animals. *Key concepts:* Flowers, trees, grass, pets, farm animals. *Real-world contexts:* Nature walk, playing in the yard, going to the park, visiting a pet store or working farm, family or classroom pets.	**L.OR.P.EB.III.2.h.1a** Identify plants and animals. *Key concepts:* Flowers, trees, grass, weeds, vegetable plants, pets, farm animals, wild animals. *Real-world contexts:* Nature walk; trip to the grocery store; visiting a pet store, working farm, horticultural center, or zoo.

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: ORGANIZATION OF LIVING THINGS (OR)
All students will use classification systems to describe groups of living things.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	Elementary School	Middle School	High School
MCF v.2000 Science Benchmark	**III.2.e.3** Describe life cycles of familiar organisms. *Key concepts:* Life cycle stages—egg, young, adult; seed, plant, flower, fruit; larva, pupa. *Real-world contexts:* Common plants and animals such as bean plants, apple trees, butterflies, grasshoppers, frogs, birds.	**III.2.m.2** Describe the life cycle of a flowering plant. *Key concepts:* Flowering plant parts and processes— roots, stems, leaves, flowers, fruits, seeds, embryo, pollen, ovary, egg cell, germination, fertilization. *Tools:* Microscope, hand lens. *Real-world contexts:* Common flowering plants, such as bean, tulip.	**III.2.h.2** Describe the life cycle of an organism associated with human disease. *Key concepts:* Infection process—disease, parasite, carrier, host, infection. *Tools:* Microscope, hand lens. *Real-world contexts:* Life cycle of organism(s) associated with human disease(s), such as Lyme disease—tick, malaria—mosquito, parasites.
Functional Independence Extended Benchmark Classroom/LEA/ISD and State	**L.OR.FI.EB.III.2.e.3a** Identify life cycles of familiar organisms. *Key concepts:* Life cycle stages. Egg, young, adult. Baby, child, adult. Seed, plant, flower, fruit. *Real-world contexts:* Family, pets, butterfly gardens, caring for plants.	**L.OR.FI.EB.III.2.m.2a** Identify stages of the life cycle of flowering plants. *Key concepts:* Flowering plant parts—roots, stems, leaves, flowers, seeds, processes—germination. *Real-world contexts:* Gardening, visiting an orchard.	**L.OR.FI.EB.III.2.h.2a** Identify the life cycle of an organism associated with human disease. *Key concepts:* Infection process—disease, parasite, infection. *Real-world contexts:* Visiting the doctor, caring for others.
Supported Independence Extended Benchmark Classroom/LEA/ISD and State	**L.OR.SI.EB.III.2.e.3a** Match the life cycles of familiar organisms. *Key concepts:* Sapling—mature tree, corn—corn stalks, berry—bushes, pumpkin—vine. *Real-world contexts:* Growing small plants, gardening.	**L.OR.SI.EB.III.2.m.2a** Sequence parts of life cycles of flowering plants. *Key concepts:* Seed—sprout, young plant—mature plant. *Real-world contexts:* Growing small plants, gardening, visiting a working farm (for example, life cycle of a tomato plant).	**L.OR.SI.EB.III.2.e.3ADDh** Sequence parts of life cycles of insects. *Key concepts:* Egg—larva—pupa—adult. *Real-world contexts:* Mosquitoes, ticks.
Participation Extended Benchmark Classroom/LEA/ISD and State	**L.OR.P.EB.III.2.e.3a** Identify parts of life cycles of familiar organisms. *Key concepts:* Baby, mom, dad, adult, young/old. *Real-world contexts:* Family.	**L.OR.P.EB.III.2.m.2a** Identify parts of life cycles of plants. *Key concepts:* Seed, flower, tree, young/old. *Real-world contexts:* Flower pots, gardens.	**L.OR.P.EB.III.2.e.3ADDh** Identify parts of life cycles of animals. *Key concepts:* Baby, mom, dad, adult, young/old. *Real-world contexts:* Family.

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: ORGANIZATION OF LIVING THINGS (OR)
All students will investigate and explain how living things obtain and use energy.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	Elementary School	Middle School	High School
MCF v.2000 Science Benchmark	**III.2.e.4** Compare and contrast food, energy, and environmental needs of selected organisms. *Key concepts:* Life requirements—food, air, water, minerals, sunlight, space, habitat. See LEC-III.5 e.2. *Real-world contexts:* Germinating seeds, such as beans, corn; aquarium or terrarium life, such as guppy, goldfish, snail.	**III.2.m.3** Describe evidence that plants make and store food. *Key concepts:* Process and products of food production and transport—photosynthesis, starch, sugar, oxygen, carbon dioxide, water. See LO m.4 (use of food for energy.) *Real-world contexts:* Plant food storage organs, such as potato, onion; starch storage in plants grown under different conditions.	**III.2.h.3** Explain the process of food storage and food use in organisms. *Key concepts:* Cellular respiration, photosynthesis (see LO m.3), oxygen, sunlight, carbon dioxide, carbohydrate, fat, protein, minerals, water. See LC-III.1 h.1 (how organisms grow), LO-III.2 m.3 (how plants store food) LO-III.2 m.4 (how food and oxygen are distributed to cells), LEC-III.5 m.2 (the sun as the ultimate source of energy for organisms) and PCM-IV.2 m.3 (energy transformations). *Real-world contexts:* Food storage, such as maple tree—maple sap, potato—starch, honey bee—honey, cow—beef, milk. Weight gain and weight loss. Change in respiration rates with exercise.
Functional Independence Extended Benchmark Classroom/LEA/ISD and State	**L.OR.FI.EB.III.2.e.4a** Identify the basic life requirements of plants and animals. *Key concepts:* Food, air, water, sunlight. *Real-world contexts:* Planting seeds for garden, maintaining fish tank.	**L.OR.FI.EB.III.2.m.3a** Explain where the plants make and store food. *Key concepts:* Make food in leaves, store food in roots. *Real-world contexts:* Food preparation (such as, What part of the carrot do you eat?).	**L.OR.FI.EB.III.2.h.3a** Explain why plants and animals store food. *Key concepts:* Store energy for later use. *Real-world contexts:* Tapping maple tree, collecting honey, milking cow.
Supported Independence Extended Benchmark Classroom/LEA/ISD and State	**L.OR.SI.EB.III.2.e.4a** Identify some common healthy foods. *Key concepts:* Milk, apple, fish, meat, eggs. *Real-world contexts:* Shopping, making healthy food choices.	**L.OR.SI.EB.III.2.e.4ADDm** Sort several foods into two groups. *Key concepts:* Nutritional/non-nutritional. Vegetables, fruits, dairy, meat, grains. *Real-world contexts:* Shopping, cooking, making healthy food choices.	**L.OR.SI.EB.III.2.e.4ADDh** Sort food into six food groups. *Key concepts:* Meat, fruit, vegetables, grains, dairy, other (fats, sugar, candy). *Real-world contexts:* Using basic food pyramid, balanced meals, shopping, cooking, making healthy food choices.

Participation Extended Benchmark Classroom/LEA/ISD and State	**L.OR.P.EB.III.2.e.4a** Identify some common healthy foods. *Key concepts:* Vegetables, fruits, dairy, meat, grains. *Real-world contexts:* Eating, shopping, making healthy food choices.	**L.OR.P.EB.III.2.e.4ADDm** Identify some common healthy foods. *Key concepts:* Vegetables, fruits, dairy, meat, grains. *Real-world contexts:* Eating, shopping, cooking, making healthy food choices.	**L.OR.P.EB.III.2.e.4ADDh** Identify some common healthy foods. *Key concepts:* Vegetables, fruits, dairy, meats, grains. *Real-world contexts:* Eating, shopping, cooking, food preparation, making healthy food choices.

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: ORGANIZATION OF LIVING THINGS (OR)
All students will analyze how parts of living things are adapted to carry out specific functions.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	Elementary School	Middle School	High School
MCF v.2000 Science Benchmark	**III.2.e.5** Explain functions of selected seed plant parts. *Key concepts:* Plant parts roots, stems, leaves, flowers, fruits, seeds. *Real-world contexts:* Common edible plant parts, such as bean, cauliflower, carrot, apple, tomato, spinach. (See LE-III.4 e.2 about functions of selected animal body parts.)	**III.2.m.4** Explain how selected systems and processes work together in animals. *Key concepts:* Systems/Processes—digestion, circulation, respiration, endocrine, reproduction, skeletal, muscular, nervous, excretion, transport, growth, repair. *Real-world contexts:* Interrelations of body systems during selected activities, such as among skeletal, muscular, circulatory, and respiratory systems during physical exercise.	**III.2.h.4** Explain how living things maintain a stable internal environment. *Key concepts:* Related systems/cells/ chemicals—excretory system, endocrine system, circulatory system, hormones, immune response, white blood cell, bacteria, virus. Factors/ mechanisms under control—temperature, disease/infection, homeostasis. *Real-world contexts:* Mechanisms for maintaining internal stability, such as body temperature, disease control.
Functional Independence Extended Benchmark Classroom/LEA/ISD and State	**L.OR.FI.EB.III.2.e.5a** Identify functions of selected seed plant parts. *Key concepts:* Plant parts—roots, stems, leaves, flowers. *Real-world contexts:* Food preparation (common edible plant parts, such as bean, cauliflower, carrot, apple, tomato, spinach); gardening.	**L.OR.FI.EB.III.2.m.4a** Identify how selected systems and processes work together in animals. *Key concepts:* Systems/processes—digestion/ excretion, skeletal/muscular. *Real-world contexts:* Exercising (Where does your food go?).	**L.OR.FI.EB.III.2.h.4a** Recognize how living things maintain a healthy balance. *Key concepts:* Related systems/cells—white blood cell, bacteria, virus. Factors/mechanisms under control—temperature, disease/infection. *Real-world contexts:* Maintaining health, doctor appointment, appropriate dress (for weather).
Supported Independence Extended Benchmark Classroom/LEA/ISD and State	**L.OR.SI.EB.III.2.e.5a** Identify edible parts of plants. *Key concepts:* Fruits and vegetables. *Real-world contexts:* Shopping, gardening.	**L.OR.SI.EB.III.2.m.4a** Associate five senses with the respective body part. *Key concepts:* Smell—nose, sight—eyes, hearing—ears, taste—tongue, touch—hands. *Real-world contexts:* Eating, cooking, listening to music.	**L.OR.SI.EB.III.2.h.4a** Identify the effects of illness on the body and/or avoiding illness. *Key concepts:* Sore throat, earache, runny nose, fever (feel hot), headache, stomachache. *Real-world contexts:* Staying home sick, asking for help, going to the doctor.

Participation Extended Benchmark Classroom/LEA/ISD and State	**L.OR.P.EB.III.2.e.5a** Identify edible plants. *Key concepts:* Fruits and vegetables. *Real-world contexts:* Shopping, gardening.	**L.OR.P.EB.III.2.m.4a** Associate five senses with the respective body part. *Key concepts:* Smell—nose, sight—eyes, hearing—ears, taste—tongue, touch—hands. *Real-world contexts:* Dressing, eating, grooming, simple exercising.	**L.OR.P.EB.III.2.h.4a** Identify healthy exercise routines for humans. *Key concepts:* Pushing, lifting, carrying, throwing, walking, riding bicycle, swimming. *Real-world contexts:* Physical Education, health club, exercise videos.

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: ORGANIZATION OF LIVING THINGS (OR)
All students will analyze how parts of living things are adapted to carry out specific functions.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	Elementary School	Middle School	High School
MCF v.2000 Science Benchmark	**None**	**None**	**III.2.h.5** Describe technology used in the prevention, diagnosis, and treatment of diseases, and explain its function in terms of human body processes. *Key concepts:* Available technologies—sanitation, adequate food and water supplies, inoculation, antibodies, biochemistry, medicines, organ transplants. (See PWV-IV.4 h.4, ultrasound/x-ray.) *Real-world contexts:* Common contexts for these technologies—health maintenance and disease prevention activities, such as exercise and controlled diets; health monitoring activities, such as cholesterol and blood pressure checks and various tests for cancer.
Functional Independence Extended Benchmark Classroom/LEA/ISD and State	**N/A**	**N/A**	**L.OR.FI.EB.III.2.h.5a** Describe how technology is used to prevent, diagnose, and treat disease in humans. *Key concepts:* Available technologies—immunizations (prevent), x-rays (diagnose), chemotherapy (treat). *Real-world contexts:* Health maintenance and disease prevention; dangers of tattoos and body piercing.
Supported Independence Extended Benchmark	**N/A**	**N/A**	**N/A**
Participation Extended Benchmark	**N/A**	**N/A**	**N/A**

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: HEREDITY (HE)
All students will investigate and explain how characteristics of living things are passed on through generations.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	Elementary School	Middle School	High School
MCF v.2000 Science Benchmark	**III.3.e.1** Give evidence that characteristics are passed from parents to young. *Key concepts:* Characteristics—hair and feather color, eye color, leaf shape, flower structure. *Real-world contexts:* Example of mature and immature organisms, such as dogs/puppies, cats/kittens, maple trees/saplings, beans/seedlings.	**III.3.m.1** Describe how the characteristics of living things are passed on through generations. *Key concepts:* Reproductive cells—egg, sperm. Chromosome, gene, hereditary information. *Real-world contexts:* Common traits controlled by a single gene pair, such as wrinkled or smooth seeds in a pea plant, color of horse hair; human traits such as tongue rolling.	**III.3.h.1** Explain how characteristics of living things are passed on from generation to generation. *Key concepts:* Traits—dominant, recessive. Genetic material—gene pair, gene combination, gene sorting. *Real-world contexts:* Common contexts—inheritance of a human genetic disease/disorder, such as sickle cells anemia; a family tree focused on certain traits; examining animal or plant pedigrees.
Functional Independence Extended Benchmark Classroom/LEA/ISD and State	**L.HE.FI.EB.III.3.e.1a** Identify how parents and their young look alike. *Key concepts:* Characteristics—hair and feather color, eye color, leaf shape, flower structure. *Real-world contexts:* Pets, visiting a zoo, gardening.	**L.HE.FI.EB.III.3.m.1a** Identify the characteristics of living things that are passed on through generations. *Key concepts:* Reproductive cells—egg, sperm, hereditary information. *Real-world contexts:* Family, pets, gardening.	**L.HE.FI.EB.III.3.h.1a** Identify and/or describe how characteristics of living things are passed on from generation to generation. *Key concepts:* Traits—dominant, recessive. Traits, fur, scales, feet. *Real-world contexts:* Family, pets.
Supported Independence Extended Benchmark Classroom/LEA/ISD and State	**L.HE.SI.EB.III.3.e.1a** Match parent to offspring. *Key concepts:* Match immature offspring to mature adult (humans, dogs, cats). *Real-world contexts:* Family, pets.	**L.HE.SI.EB.III.3.m.1a** Match parent to offspring. *Key concepts:* Match immature offspring to mature adult (humans, dogs, cats). *Real-world contexts:* Family, pets.	**L.HE.SI.EB.III.3.h.1a** Match parent to offspring. *Key concepts:* Match immature offspring to mature adult (humans, dogs, cats). *Real-world contexts:* Family, pets. Traits, fur, scales, feet.
Participation Extended Benchmark Classroom/LEA/ISD and State	**L.HE.P.EB.III.3.e.1a** Match parent to offspring. *Key concepts:* Match immature offspring to mature adult (humans, dogs, cats). *Real-world contexts:* Family, pets.	**L.HE.P.EB.III.3.m.1a** Match parent to offspring. *Key concepts:* Match immature offspring to mature adult (humans, dogs, cats). *Real-world contexts:* Family, pets.	**L.HE.P.EB.III.3.h.1a** Match parent to offspring. *Key concepts:* Match immature offspring to mature adult (humans, dogs, cats). *Real-world contexts:* Family, pets. Traits, fur, scales, feet.

SCIENCE **STRAND: USING LIFE SCIENCE KNOWLEDGE (L)**			
STANDARD: HEREDITY (HE) *All students will explain why organisms within a species are different from one another.*			
Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	**Elementary School**	**Middle School**	**High School**
MCF v.2000 Science Benchmark	**None**	**III.3.m.2** Describe how heredity and environment may influence/determine characteristics of an organism. *Key concepts:* Traits—inherited, acquired. *Real-world contexts:* Data on heredity, such as identical twin studies, effects of introduced toxins, effects of natural selection, effects of controlled selection and breeding.	**III.3.h.2** Describe how genetic material is passed from parent to young during sexual and asexual reproduction. *Key concepts:* Types of cell division—mitosis, meiosis. DNA replication, chromosome. Types of reproduction—sexual, asexual. Genetic variation. *Tools:* A-V media, diagrams showing DNA replication during cell division. *Real-world contexts:* Fruit flies, yeast, reproduction by spores, cloning.
Functional Independence Extended Benchmark Classroom/LEA/ISD	**N/A**	**L.HE.FI.EB.III.3.m.2a** Identify how heredity and environment may affect human characteristics. *Key concepts:* Traits—inherited, acquired. *Real-world contexts:* Personal health habits—eating, smoking, alcohol.	**L.HE.FI.EB.III.3.h.2a** Identify how genetic material is passed from parent to young. *Key concepts:* Genetic variation—why siblings do not look exactly alike. *Real-world contexts:* Family.
Supported Independence Extended Benchmark	**N/A**	**N/A**	**N/A**
Participation Extended Benchmark	**N/A**	**N/A**	**N/A**

SCIENCE **STRAND: USING LIFE SCIENCE KNOWLEDGE (L)**			
STANDARD: HEREDITY (HE) *All students will explain how new traits can be established by changing or manipulating genes.*			
Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	**Elementary School**	**Middle School**	**High School**
MCF v.2000 Science Benchmark	**None**	**None**	**III.3.h.3** Explain how new traits may arise in individuals through changes in genetic material (DNA). *Key concepts:* Genetic changes—variation, new gene combinations, mutation. Natural and human produced sources of mutation—radiation, chemicals. See LE-III.4 m.2 (how new traits become established in populations.) *Real-world contexts:* Products of genetic engineering, such as medical advances—insulin, cancer drugs; agricultural related products, such as navel oranges, new flower colors, higher-yield grains; effects of natural and man-made contamination; examples of variations due to new gene combinations, such as hybrid organisms or new plant varieties resulting from multiple sets of genes.
Functional Independence Extended Benchmark	**N/A**	**N/A**	**N/A**
Supported Independence Extended Benchmark	**N/A**	**N/A**	**N/A**
Participation Extended Benchmark	**N/A**	**N/A**	**N/A**

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: EVOLUTION (EV)
All students will explain how scientists construct and scientifically test theories concerning the origin of life and evolution of species.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	**Elementary School**	**Middle School**	**High School**
MCF v.2000 Science Benchmark	**III.4.e.1** Explain how fossils provide evidence about the nature of ancient life. *Key concepts:* Types of evidence—fossil, extinct, ancient, modern life forms. See EG-V.1 e.4 (rocks and fossils provide evidence of history of the earth). *Real-world contexts:* Common contexts—plant and animal fossils, museum dioramas and 42 paintings/drawings of ancient life and/or habitats.	**III.4.m.1** Describe how scientific theory traces possible evolutionary relationships among present and past life forms. *Key concepts:* Selected evidence of common ancestry—geologic time, fossil, bone, embryo, limb. *Real-world contexts:* Fossils that show evidence of common ancestry, such as similarity of vertebrate limb bones, similarity of early vertebrate embryos, similarity of fossil bones to those of contemporary animals i.e., horse legs.	**III.4.h.1** Describe what biologists consider to be evidence for human evolutionary relationships to selected animal groups. *Key concepts:* Common types of evidence used—hominid fossils, vestigial structures, DNA, protein structure. *Real-world contexts:* Skeletal comparisons, such as modern human to hominid fossils; anatomical and biochemical similarities of humans and other higher primates, such as blood proteins; similarity of early human embryo stages to those of other vertebrates; vestigial structures, such as appendix, tail bone.
Functional Independence Extended Benchmark Classroom/LEA/ISD	**L.EV.FI.EB.III.4.e.1a** Describe what a fossil is. *Key concepts:* Characteristics of fossils—extinct, ancient. *Real-world contexts:* Visiting a museum, finding Petoskey stones.	**L.EV.FI.EB.III.4.m.1a** Explain how fossils provide evidence about the nature of ancient life. *Key concepts:* Types of evidence—fossil, extinct, ancient, modern life forms. *Real-world contexts:* Visiting a museum, finding Petoskey stones.	**L.EV.FI.EB.III.4.h.1a** Recognize theories that attempt to explain how life evolves. *Key concepts:* Evolution, natural selection (survival of the fittest). *Real-world contexts:* Visiting a museum, finding Petoskey stones.
Supported Independence Extended Benchmark	**N/A**	**N/A**	**N/A**
Participation Extended Benchmark	**N/A**	**N/A**	**N/A**

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: EVOLUTION (EV)
All students will compare ways that living organisms are adapted (suited) to survive and reproduce in their environments and explain how species change through time.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	Elementary School	Middle School	High School
MCF v.2000 Science Benchmark	**III.4.e.2** Explain how physical and behavioral characteristics of animals help them to survive in their environments. *Key concepts:* Characteristics—adaptation, instinct, learning, habit. Traits and their adaptive values— sharp teeth or claws for catching and killing prey, color for camouflage, behaviors. *Real-world contexts:* Common vertebrate adaptations, such as white polar bears, sharp claws and sharp canines for predators, changing colors of chameleon; behaviors, such as migration, communication of danger.	**III.4.m.2** Explain how new traits might become established in a population and how species become extinct. *Key concepts:* Environmental change, variation in populations, reproductive success. *Real-world contexts:* Examples of inheritable and non-inheritable variations, such as white-eyed fruit fly or scars; examples of variations due to new gene combinations, such as hybrid organisms.	**III.4.h.2** Explain how a new species or variety may originate through the evolutionary process of natural selection. *Key concepts:* Concept of species; how new species or varieties are established—natural selection, inheritable, non-inheritable characteristics, species variation. *Real-world contexts:* Contemporary examples of natural selection, such as bacteria resistance to antibiotics, insect resistance to pesticides; examples of artificial selection, such as agricultural selection to increase production, selecting desired traits for pets; historical examples of naïve explanations of evolution, such as the Lamarckian explanation of the evolution of the giraffe's long neck.
Functional Independence Extended Benchmark Classroom/LEA/ISD and State	**L.EV.FI.EB.III.4.e.2a** Identify how an animal may adapt to its environment. *Key concepts:* Traits and their adaptive values—sharp teeth or claws for catching and killing prey, color for camouflage, behaviors. *Real-world contexts:* Pets, visiting a zoo.	**L.EV.FI.EB.III.4.m.2a** Identify how species may become extinct. *Key concepts:* Environmental change, variation in populations, reproductive success. *Real-world contexts:* Pets, visiting a museum.	**L.EV.FI.EB.III.4.h.2a** Identify and/or explain how a new species might evolve. *Key concepts:* Concept of species; how new species or varieties are established—natural selection, inheritable, non-inheritable characteristics, species variation. *Real-world contexts:* Pets, health issues.
Supported Independence Extended Benchmark Classroom/LEA/ISD and State	**L.EV.SI.EB.III.4.e.2a** Identify characteristics that help living organisms survive. *Key concepts:* Run, fly, jump. *Real-world contexts:* Nature walk; squirrel running up a tree, animals running away from humans.	**L.EV.SI.EB.III.4.m.2a** Identify characteristics that help living organisms avoid extinction. *Key concepts:* Survival—sharp teeth, wings. *Real-world contexts:* Nature walk; squirrel running up a tree, animals running away from humans.	**L.EV.SI.EB.III.4.m.2ADDh** Identify characteristics that help living organisms avoid extinction. *Key concepts:* Migration, camouflage. *Real-world contexts:* Walking in the park; white polar bear, zebra, giraffe; seasons (migration, animals changing color).

Participation Extended Benchmark	**N/A**	**N/A**	**N/A**

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: ECOSYSTEMS (EC)
All students will explain how parts of an ecosystem are related and how they interact.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	Elementary School	Middle School	High School
MCF v.2000 Science Benchmark	**III.5.e.1** Identify familiar organisms as part of a food chain or food web and describe their feeding relationships within the web. *Key concepts:* Producer, consumer, predator, prey, decomposer, habitat, community. *Real-world contexts:* Food chains and food webs involving organisms, such as rabbits, birds, snakes, grasshoppers, plants.	**III.5.m.1** Describe common patterns of relationships among populations. *Key concepts:* Participants and relationships—predator, prey, parasite, competition, mutually beneficial. *Real-world contexts:* Relationships among plants and animals in an ecosystem—mutually helpful relationships, such as insects and flowering plants, birds eating fruit and spreading seeds; parasitic (harmful) relationships, such as humans and mosquitoes, trees and mistletoe; competitive relationships, including squirrels and seed-eating birds, weeds and garden plants.	**III.5.h.1** Describe common ecological relationships between and among species and their environments. *Key concepts:* Competition, territory, carrying capacity, natural balance, population, dependence, survival; biotic, abiotic factors. *Real-world contexts:* Animals that live in packs or herds and plant colonies, such as—wolves, bison, lilies and other bulb plants, various forms of algae.
Functional Independence Extended Benchmark Classroom/LEA/ISD and State	**L.EC.FI.EB.III.5.e.1a** Identify familiar organisms as part of a food chain or food web. *Key concepts:* Producer, consumer, predator, prey. *Real-world contexts:* Camping, fishing, hunting.	**L.EC.FI.EB.III.5.m.1a** Describe common patterns of relationships among populations. *Key concepts*: Participants and relationships—predator, prey, parasite, competition, mutually beneficial. *Real-world contexts:* Nature walk, visiting a park.	**L.EC.FI.EB.III.5.h.1a** Describe common ecological relationships between and among species and their environments. *Key concepts:* Competition, territory, natural balance, population, dependence, symbiosis, survival. *Real-world contexts:* Camping, fishing, hunting, visiting a zoo.
Supported Independence Extended Benchmark	**N/A**	**N/A**	**N/A**
Participation Extended Benchmark	**N/A**	**N/A**	**N/A**

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: ECOSYSTEMS (EC)
All students will explain how energy is distributed to living things in an ecosystem.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	Elementary School	Middle School	High School
MCF v.2000 Science Benchmark	**III.5.e.2** Describe the basic requirements for all living things to maintain their existence. *Key concepts:* Needs of life—food, habitat, water, shelter, air, light, minerals. See LO-III.2 e.4. *Real-world contexts:* Selected ecosystems, such as an aquarium, rotting log, terrarium, backyard, local pond or wetland, wood lot.	**III.5.m.2** Describe how organisms acquire energy directly or indirectly from sunlight. *Key concepts:* Sunlight, plants, food, photosynthesis, producers, consumers, food webs. See LO-III.2 m.3 (photosynthesis and food use). *Real-world contexts:* Selected food webs, including humans.	**III.5.h.2** Explain how energy flows through familiar ecosystems. *Key concepts:* Participants and relationships—food chain, food web, energy pyramid, energy flow, producers, consumers, decomposers. See LO-III.2 m.3 (producers), PCM-IV.2 h.4 (conservation of energy). *Real-world contexts:* Energy pyramids for food webs in various ecosystems.
Functional Independence Extended Benchmark Classroom/LEA/ISD and State	**L.EC.FI.EB.III.5.e.2a** Identify the basic requirements for all living things to maintain their existence. *Key concepts:* Needs of life—food, habitat, water, shelter, air, light, minerals. *Real-world contexts:* Pets, wild animals.	**L.EC.FI.EB.III.5.m.2a** Identify and/or describe that organisms acquire energy directly or indirectly from sunlight. *Key concepts:* Sunlight, plants, food, photosynthesis, producers, consumers, food webs. *Real-world contexts:* Gardening, lawn care.	**L.EC.FI.EB.III.5.h.2a** Identify and/or explain that energy flows through familiar ecosystems. *Key concepts:* Participants and relationships—food chain, food web, energy pyramid, energy flow, producers, consumers, decomposers. *Real-world contexts:* Food preparation, healthy living.
Supported Independence Extended Benchmark Classroom/LEA/ISD and State	**L.EC.SI.EB.III.5.e.2a** Identify basic requirements for all living things to maintain life. *Key concepts:* Food, water, shelter. *Real-world contexts:* Caring for pets, visiting a nature center or a zoo; squirrels eating acorns, birds eating seeds, cats eating birds; doghouse.	**L.EC.SI.EB.III.5.m.2a** Identify that animals acquire energy through food. *Key concepts:* Adults caring for offspring—feeding and protection. *Real-world contexts:* Visiting a working farm; mother bird feeding worm to baby bird, nursing kittens.	**L.EC.SI.EB.III.5.e.2ADDh** Identify/categorize plants and animals found within natural ecosystems. *Key concepts:* Different habitats—bodies of water, woods, field. *Real-world contexts:* Terrarium, what plants or animals are found in the woods, what plants or animals are found in the water.
Participation Extended Benchmark	**N/A**	**N/A**	**N/A**

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: ECOSYSTEMS (EC)
All students will investigate and explain how communities of living things change over a period of time.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	Elementary School	Middle School	High School
MCF v.2000 Science Benchmark	**III.5.e.3** Design systems that encourage growing of particular plants or animals. *Key concepts:* Needs of life—food, habitat, water, shelter, air, light, minerals. *Real-world contexts:* Ecosystems managed by humans, including farms, ranches, gardens, lawns, potted plants.	**III.5.m.3** Predict the effects of changes in one population in a food web on other populations. *Key concepts:* Natural balance, population, dependence, survival, community, biodiversity, introduction of non-native species. *Real-world contexts:* Plants and animals in an ecosystem dependent upon each other for survival in selected ecosystems—see LEC-III.5 e.2; comparison of animals and plants found in polluted vs. non-polluted water, urban vs. rural settings, rural vs. forest settings; zebra mussels introduced into the Great Lakes, gypsy moths defoliating trees.	**III.5.h.3** Describe general factors regulating population size in ecosystems. *Key concepts:* Carrying capacity, competition, parasitism, predation, loss of habitat. *Real-world contexts:* Common factors that influence relationships, such as weather, disease, predation, migration.
Functional Independence Extended Benchmark Classroom/LEA/ISD and State	**L.EC.FI.EB.III.5.e.3a** Identify systems that encourage the growth of particular plants or animals. *Key concepts:* Needs of life—food, habitat, water, shelter, air, light, minerals. *Real-world contexts:* Gardening, lawn care, farming.	**L.EC.FI.EB.III.5.m.3a** Identify the effects of changes in one population in a food web on other populations. *Key concepts:* Natural balance (organism, population, community), introduction of non-native species. *Real-world contexts:* Wildlife, landscaping, boating.	**L.EC.FI.EB.III.5.h.3a** Identify and/or describe general factors that influence population size in ecosystems. *Key concepts:* Carrying capacity (population limit), competition, parasitism, predation, loss of habitat. *Real-world contexts:* Hunting, fishing, wildlife management.
Supported Independence Extended Benchmark	**N/A**	**N/A**	**N/A**
Participation Extended Benchmark	**N/A**	**N/A**	**N/A**

SCIENCE **STRAND: USING LIFE SCIENCE KNOWLEDGE (L)**			
STANDARD: ECOSYSTEMS (EC) *All students will investigate and explain how communities of living things change over a period of time.*			
Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	**Elementary School**	**Middle School**	**High School**
MCF v.2000 Science Benchmark	**None**	**III.5.m.4** Describe the likely succession of a given ecosystem over time. *Key concepts:* Succession, stages, climax community, pioneer. *Real-world contexts:* Process of gradual change in ecological systems, such as in ponds or abandoned farm fields.	**III.5.h.4** Describe responses of an ecosystem to events that cause it to change. *Key concepts:* Succession, pioneer, climate/physical conditions, introduction of new/different species, elimination of existing species, biodiversity; cataclysmic changes. *Real-world contexts:* Climax forests comprised of maple, beech, or conifers; effects of urban sprawl or clear cutting forests; effects of cataclysmic changes such as the eruption of Mt. St. Helens.
Functional Independence Extended Benchmark Classroom/LEA/ISD	**N/A**	**L.EC.FI.EB.III.5.m.4a** Identify the likely changes of a given ecosystem over time. *Key concepts:* Stages (pioneer community-climax community). *Real-world contexts:* Landscaping, camping, farming.	**L.EC.FI.EB.III.5.h.4a** Describe responses of an ecosystem to events that cause it to change. *Key concepts:* Pioneer, climate/physical conditions, introduction of new/different species, elimination of existing species, catastrophic changes. *Real-world contexts:* Nature walk, landscaping.
Supported Independence Extended Benchmark	**N/A**	**N/A**	**N/A**
Participation Extended Benchmark	**N/A**	**N/A**	**N/A**

SCIENCE STRAND: USING LIFE SCIENCE KNOWLEDGE (L)			
STANDARD: ECOSYSTEMS (EC) *All students will describe how materials cycle through an ecosystem and get reused in the environment.*			
Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	**Elementary School**	**Middle School**	**High School**
MCF v.2000 Science Benchmark	**None**	**None**	**III.5.h.5** Describe how carbon and soil nutrients cycle through selected ecosystems. *Key concepts:* Common nutrients/elements — nitrogen, sulfur, carbon, phosphorous. Inorganic compounds containing nutrients—soil minerals, carbon dioxide. Organic compounds in living communities—proteins, fats, carbohydrates. See LOIII. 2 h.3 (cell respiration) and LO-III.2 m.3 (photosynthesis). *Real-world contexts:* Movement of food materials through various food webs, including decomposition.
Functional Independence Extended Benchmark	**N/A**	**N/A**	**N/A**
Supported Independence Extended Benchmark	**N/A**	**N/A**	**N/A**
Participation Extended Benchmark	**N/A**	**N/A**	**N/A**

SCIENCE
STRAND: USING LIFE SCIENCE KNOWLEDGE (L)

STANDARD: ECOSYSTEMS (EC)
All students will analyze how humans and the environment interact.

Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	Elementary School	Middle School	High School
MCF v.2000 Science Benchmark	**III.5.e.4** Describe positive and negative effects of humans on the environment. *Key concepts:* Human effects on the environment— garbage, habitat destruction, land management, renewable and non-renewable resources. *Real-world contexts:* Household wastes, school wastes, waste water treatment, habitat destruction due to community growth, reforestation projects, establishing parks or other green spaces, recycling.	**III.5.m.5** Explain how humans use and benefit from plant and animal materials. *Key concepts:* Materials from plants, including— wood, paper, cotton, linen, starch, rubber, wax, and oils. Materials from animals, including leather, wool, fur, oils, wax. *Real-world contexts:* Human-made objects that incorporate plant and animal materials, including clothing, building materials, machines, and medicines.	**III.5.h.6** Explain the effects of agriculture and urban development on selected ecosystems. *Key concepts:* Common factors that influence ecosystems, such as pollution of ecosystems from fertilizer, insecticide, and other chemicals. Land management, biodiversity, sustainability. Loss of habitat. See PME-IV.1 h.1 (risk/benefit analysis), EH-V.2 h.2 (water pollution). *Real-world contexts:* Common factors that influence ecosystems, such as pollution of ecosystems from fertilizer, insecticide, and other chemicals.
Functional Independence Extended Benchmark Classroom/LEA/ISD and State	**L.EC.FI.EB.III.5.e.4a** Identify positive and negative effects of humans on the environment. *Key concepts:* Human effects on the environment. *Real-world contexts:* Household wastes, school wastes, waste water treatment, establishing parks, recycling, garbage.	**L.EC.FI.EB.III.5.m.5a** Identify how humans use and benefit from plant and animal materials. *Key concepts:* Materials from plants, including wood, paper, cotton, linen, starch, rubber, wax, and oils. Materials from animals, including leather, wool, fur, oils, and wax. *Real-world contexts:* Clothing, building materials, and medicines.	**L.EC.FI.EB.III.5.h.6a** Describe the effects of agriculture and urban development on selected ecosystems. *Key concepts:* Common factors that influence ecosystems, such as pollution of ecosystems from fertilizer, insecticide, and other chemicals. Land management, biodiversity, sustainability. Loss of habitat. *Real-world contexts:* Fertilizer, insecticide, and other chemicals.

Supported Independence Extended Benchmark Classroom/LEA/ISD and State	**L.EC.SI.EB.III.5.e.4a** Identify items within ecosystems developed and maintained by people. *Key concepts:* Farm—eggs come from chickens, milk comes from cows, people eat eggs and drink milk. *Real-world contexts:* Visiting a working farm or the farmers' market; guest speakers.	**L.EC.SI.EB.III.5.m.5a** Identify items within ecosystems developed and maintained by people. *Key concepts:* Farm and crops—people grow the corn, corn is fed to the animals. *Real-world contexts:* Visiting a working farm or county fair; FFA (Future Farmers of America), 4-H.	**L.EC.SI.EB.III.5.h.6a** Identify/categorize items within ecosystems developed and maintained by people. *Key concepts:* Farms, crops, and usable products—animals produce the milk/meat/eggs, which are consumed by the people. Other usable products—wool, fur, leather. *Real-world contexts:* Grocery store, butcher, clothing store, tannery.
Participation Extended Benchmark	**N/A**	**N/A**	**N/A**

SCIENCE **STRAND: USING LIFE SCIENCE KNOWLEDGE (L)**			
STANDARD: ECOSYSTEMS (EC) *All students will analyze how humans and the environment interact.*			
Level of Independence (Full, FI, SI, P) Assessable at: (Classroom/LEA/ISD, State)	**Elementary School**	**Middle School**	**High School**
MCF v.2000 Science Benchmark	**None**	**III.5.m.6** Describe ways in which humans alter the environment. *Key concepts:* Agriculture, land use, renewable and non-renewable resource development, resource use, solid waste, toxic waste. Biodiversity. See EG-V.1 m.5, EH-V.2 m.3, EAW-V.3 m.4. *Real-world contexts:* Human activities, such as farming, pollution from manufacturing and other sources, hunting, habitat destruction, land development, reforestation, species reintroduction.	**None**
Functional Independence Extended Benchmark Classroom/LEA/ISD	**N/A**	**L.EC.FI.EB.III.5.m.6a** Describe ways in which humans alter the environment. *Key concepts:* Agriculture, land use, renewable and non-renewable resource development, resource use, solid waste, toxic waste. Biodiversity. *Real-world contexts:* Farming, hunting, planting trees.	**L.EC.FI.EB.III.5.m.6ADDh** Describe ways in which humans alter the environment. *Key concepts:* Agriculture, land use, renewable and non-renewable resource development, resource use, solid waste, toxic waste. Biodiversity. *Real-world contexts:* Farming, hunting, planting trees.
Supported Independence Extended Benchmark	**N/A**	**N/A**	**N/A**
Participation Extended Benchmark	**N/A**	**N/A**	**N/A**