Hard Bargain Farm and Maryland Science Learning Standards Alignment (Grades 3-8)

Key: C = Classroom Lesson Plan, W = Kids' Zone Web Activity, H = Hard Bargain Farm Class www.fergusonfoundation.org

Science Standard	Topic	Grade	Indicators	Objectives	Classified Information (W)	Cow In and Out (W)	Ecosystem and Food Web Mural (C)	Farm Life Exploration (H)	Habitat Hike (H)	Let's Take a Dip (C, W)	Plant Identification (W)	Take Out the Trash (C, W)	The Water Cycle (W)	Ways of a Watershed (W)	Where's the Corn (C)
1. Skills and Processes	A. Constructing Knowledge	Grades 3-5	1. Gather and question data from many different forms of scientific investigations which include reviewing appropriate print resources, observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.	1.A.1.a. Support investigative findings with data found in books, articles, and databases, and identify the sources used and expect others to do the same.			X								
				1.A.1.b. Select and use appropriate tools hand lens or microscope (magnifiers), centimeter ruler (length), spring scale (weight), balance (mass), Celsius thermometer (temperature), graduated cylinder (liquid volume), and stopwatch (elapsed time) to augment observations of objects, events, and processes.						X					
				1.A.1.c. Explain that comparisons of data might not be fair because some conditions are not kept the same.						X					
				1.A.1.d. Recognize that the results of scientific investigations are seldom exactly the same, and when the differences are large, it is important to try to figure out why.						X					
				1.A.1.e. Follow directions carefully and keep accurate records of one's work in order to compare data gathered.					X	X					
				1.A.1.f. Identify possible reasons for differences in results from investigations including unexpected differences in the methods used or in the circumstances in which the investigation is carried out, and sometimes just because of uncertainties in observations.						X					
				1.A.1.g. Judge whether measurements and computations of quantities are reasonable in a familiar context by comparing them to typical values when measured to the nearest:											

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1. Skills and Processes	A. Constructing Knowledge	Grades 6-8	1. Design, analyze, or carry out simple investigations and formulate appropriate conclusions based on data obtained or provided.	1.A.1.a. Explain that scientists differ greatly in what phenomena they study and how they go about their work.	X				X	X					
				1.A.1.b. Develop the ability to clarify questions and direct them toward objects and phenomena that can be described, explained, or predicted by scientific investigations.						X				X	
				1.A.1.c. Explain and provide examples that all hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations.						X				X	
				1.A.1.d. Locate information in reference books, back issues of newspapers, magazines and compact disks, and computer databases.			X								
				1.A.1.e. Explain that if more than one variable changes at the same time in an investigation, the outcome of the investigation may not be clearly attributable to any one of the variables.						X					
				1.A.1.f. Give examples of when further studies of the question being investigated may be necessary.						X					
				1.A.1.g. Give reasons for the importance of waiting until an investigation has been repeated many times before accepting the results as correct.						X					
				1.A.1.h. Use mathematics to interpret and communicate data.						X		X			
				1.A.1.i. Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society.						X					

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1. Skills and Processes	B. Applying Evidence and Reasoning	Grades 3-5	1. Seek better reasons for believing something than "Everybody knows that . . ." or "I just know" and discount such reasons when given by others.	1.B.1.a. Develop explanations using knowledge possessed and evidence from observations, reliable print resources, and investigations.	X		X			X		X		X	
				1.B.1.b. Offer reasons for their findings and consider reasons suggested by others.						X		X		X	
				1.B.1.c. Review different explanations for the same set of observations and make more observations to resolve the differences.											
				1.B.1.d. Keep a notebook that describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later.										X	
		Grades 6-8	1. Review data from a simple experiment, summarize the data, and construct a logical argument about the cause-and-effect relationships in the experiment.	1.B.1.a. Verify the idea that there is no fixed set of steps all scientists follow, scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence.						X					
				1.B.1.b. Explain that what people expect to observe often affects what they actually do observe and that scientists know about this danger to objectivity and take steps to try to avoid it when designing investigations and examining data.	X					X		X			
				1.B.1.c. Explain that even though different explanations are given for the same evidence, it is not always possible to tell which one is correct.											
				1.B.1.d. Describe the reasoning that lead to the interpretation of data and conclusions drawn.	X		X			X		X		X	
				1.B.1.e. Question claims based on vague statements or on statements made by people outside their area of expertise.			X			X		X		X	

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1. Skills and Processes	C. Communicating Scientific Reasoning	Grades 3-5	1. Recognize that clear communication is an essential part of doing science because it enables scientists to inform others about their work, expose their ideas to criticism by other scientists, and stay informed about scientific discoveries around the world.	1.C.1.a. Make use of and analyze models, such as tables and graphs to summarize and interpret data.			X			X		X		X	
				1.C.1.b. Avoid choosing and reporting only the data that show what is expected by the person doing the choosing.						X		X		X	
				1.C.1.c. Submit work to the critique of others which involves discussing findings, posing questions, and challenging statements to clarify ideas.			X			X		X		X	
				1.C.1.d. Construct and share reasonable explanations for questions asked.						X		X		X	
				1.C.1.e. Recognize that doing science involves many different kinds of work and engages men and women of all ages and backgrounds.											
		Grades 6-8	1. Develop explanations that explicitly link data from investigations conducted, selected readings and, when appropriate, contributions from historical discoveries	1.C.1.a. Organize and present data in tables and graphs and identify relationships they reveal.						X		X		X	
				1.C.1.b. Interpret tables and graphs produced by others and describe in words the relationships they show.						X		X			
				1.C.1.c. Give examples of how scientific knowledge is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way.										X	
				1.C.1.d. Criticize the reasoning in arguments in which											
				· Fact and opinion are intermingled											
				· Conclusions do not follow logically from the evidence given.						X					
				· Existence of control groups and the relationship to experimental groups is not made obvious.											
				· Samples are too small, biased, or not representative.						X					
				1.C.1.e. Explain how different models can be used to represent the same thing. What kind of a model to use and how complex it should be depend on its purpose. Choosing a useful model is one of the instances in which intuition and creativity come into play in science, mathematics, and engineering			X								
				1.C.1.f. Participate in group discussions on scientific topics by restating or summarizing accurately what others have said, asking for clarification or elaboration, and expressing alternative positions.			X			X					
				1.C.1.g. Recognize that important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.											

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2.0 Earth/Space Science	E. Interactions of Hydrosphere & Atmosphere	Grade 5	**1.** Recognize and describe that the amount of water on Earth continues to stay the same even though it may change from one form to another.	2.E.1.a. Describe how water on Earth changes. Condensation, Precipitation, Evaporation				X					X		
				2.E.1.b. Explain that the sun is the main source of energy that causes the changes in the water on Earth.									X		
		Grade 8	1. Cite evidence to explain the relationship between the hydrosphere and atmosphere.	2.E.1.b. Recognize and describe the water cycle as the distribution and circulation of Earth's water through the glaciers, surface water, groundwater, oceans, and atmosphere.					X				X	X	

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3. Life Science	A. Diversity of Life	Grade 4	1. Explain how animals and plants can be grouped according to observable features.	3.A.1.a. Observe and compile a list of a variety of animals or plants in both familiar and unfamiliar environments.	X		X	X	X	X	X				
				3.A.1.b. Classify a variety of animals and plants according to their observable features and provide reasons for placing them into different groups.	X		X	X	X	X	X				
				3.A.1.c. Given a list of additional animals or plants, decide whether or not they could be placed within the established groups or does a new group have to be added.	X		X			X	X				
				3.A.1.d. Describe what classifying tells us about the relatedness among the animals or plants placed within any group.	X		X			X	X				
		Grade 5	1. Explain the idea that in any particular environment, some kinds of plants and animals survive well, some less well, and some cannot survive at all.	3.A.1.a. Identify and describe features and behaviors of some of the plants and animals living in a familiar environment and explain ways that these organisms are well suited to their environment.	X		X	X	X	X					
				3.A.1.b. Based on information about the features and behaviors of animals and plants from very different environments describe reasons that they might not survive if their environment changed or if they were moved from one environment to another.	X		X		X	X					
				3.A.1.c. State reasons why certain animals such as whales, salmon, could not survive in the Chesapeake Bay.						X					
				3.A.1.d. Research the kind of environment needed by the Maryland blue crab, the Black-eyed Susan (Maryland's state flower), or another Maryland native organism.			X								
				3.A.1.e. Explain that the survival of individual organisms and entire populations can be affected by sudden (flood, Tsunami) or slow (global warming, air pollution) changes in the environment.			X			X	X				
		Grade 7	1. Compile evidence to verify the claim of biologists that the features of organisms connect or differentiate them-these include external and internal structures (features) and processes.	Provide examples and explain that organisms sorted into groups share similarities in external structures as well as similarities in internal anatomical structures and processes which can be used to infer the degree of relatedness among organisms	X				X		X				

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3. Life Science	D. Evolution	Grade 4	1. Explain that individuals of the same kind differ in their characteristics, and sometimes the differences give individuals an advantage in surviving and reproducing.	3.D.1.a. Describe ways in which organisms in one habitat differ from those in another habitat and consider how these differences help them survive and reproduce.					X	X					
				3.D.1.b. Explain that the characteristics of an organism affect its ability to survive and reproduce.	X		X	X	X	X	X				
				3.D.1.c. Examine individuals in a group of the same kind of animals or plants to identify differences in characteristics, such as hearing ability in rabbits or keenness of vision in hawks that might give those individuals an advantage in surviving and reproducing.	X		X			X					
				3.D.1.d. Examine and compare fossils to one another and to living organisms as evidence that some individuals survive and reproduce.		X									
		Grade 6	1. Explain that in any particular environment, the growth and survival of organisms and species depend on the physical conditions.	3.D.1.a. Cite examples and describe that small differences between parents and offspring can accumulate (through selective breeding) in successive generations so that descendants are very different from their ancestors.				X							
				3.D.1.b. Explain that in all environments-freshwater, marine, forest, desert, grassland, mountain, and others-organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter.			X		X	X	X				
				3.D.1.c. Explain that in any particular environment individual organisms with certain traits are more likely than others to survive and have offspring.						X	X				
				3.D.1.d. Explain, with examples, ways that people control some characteristics of plants and animals they raise by selective breeding.				X						X	
				3.D.1.e. Describe ways in which changes in environmental conditions can affect the survival of individual organisms and entire species.			X		X	X	X				
				3.D.1.f. Describe how sediments of sand and smaller particles (sometimes containing the remains of organisms) are gradually buried and are cemented together by dissolved minerals to form solid rock; and describe that such fossils provide evidence for the long history of changing life forms whose remains are found in the rocks.											
				3.D.1.g. Explain that the more recently deposited rock layers are likely to contain fossils resembling existing species.											

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3. Life Science	E. Flow of Matter and Energy	Grade 3	1. Recognize that materials continue to exist even though they change from one form to another.	3.E.1.a. Identify and compile a list of materials that can be recycled.								X			
				3.E.1.b. Identify what happens to materials when they are recycled.		X						X	X		
				3.E.1.c. Observe and record the sequence of changes that occur to plants and animals that die and decay.					X						
				3.E.1.d. Ask and develop possible answers to questions about what happens to the materials that living things are made of when they die.		X	X		X			X			
		Grade 4	1. Recognize food as the source of materials that all living things need to grow and survive.	3.E.1.a. Classify the things that people and animals take into their bodies as food or not food.		X		X							
				3.E.1.b. Describe what happens to food in plants and animals.		X		X	X						
				3.E.1.c. Identify the things that are essential for plants to grow and survive.				X	X		X				
		Grade 5	1. Recognize that some source of energy is needed for all organisms to grow and survive.	3.E.1.a. Identify the sun as the primary source of energy for all living organisms.			X	X	X						
				3.E.1.b. Cite evidence from observations and research that some insects and various other organisms depend on dead plant and animal material for food.		X	X	X	X						
				3.E.1.c. Provide examples that justify the statement “Most animals’ food can be traced back to plants.”		X	X	X	X					X	
		Grade 7	1. Explain that the transfer and transformation of matter and energy links organisms to one another and to their physical setting.	3.E.1. e. Ask and seek answers to questions about the fact that transfer of matter between organisms continues indefinitely because organisms are decomposed after death to return food materials to the environment.					X						

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3. Life Science	F. Ecology	Grade 4	1. Explain ways that individuals and groups of organisms interact with each other and their environment.	3.F.1.a. Identify and describe the interactions of organisms present in a habitat.			X	X	X	X	X				
				· Competition for space, food, and water	X		X	X	X	X	X				
				· Beneficial interactions: nesting, pollination, seed dispersal, oysters filtering as in the Chesapeake Bay, etc.			X	X	X						
				· Roles within food chains and webs: scavengers, decomposers, producers, consumers.			X	X	X						
				3.F.1.b. Explain that changes in an organism's habitat are sometimes beneficial to it and sometimes harmful.			X		X	X	X				
		Grade 6	1. Give reasons supporting the fact that the number of organisms an environment can support depends on the physical conditions and resources available.	3.F.1.a. Explain that populations increase or decrease relative to the availability of resources and the conditions of the environment.			X			X	X				
				3.F.1.b. Identify and describe factors that could limit populations within any environment, such as disease, introduction of a nonnative species, depletion of resources, etc.			X			X	X				
				3.F.1.c. Explain that within any environment organisms with similar needs may compete with one another for resources.			X			X	X				
				3.F.1.d. Cite examples to illustrate that competition is reduced when organisms use different sets of resources, such as birds in a forest eat different kinds and sizes of seeds.			X								
6. Environmental Science	A. Natural Resources and Human Needs	Grade 5	1. Recognize and explain how renewable and nonrenewable natural resources are used by humans in Maryland to meet basic needs.	6.A.1.a. Identify and compare Maryland's renewable resources and nonrenewable resources.				X	X	X		X			
				6.A.1.b. Describe how humans use renewable natural resources, such as plants, soil, water, animals.		X	X	X	X			X		X	
				6.A.1.c. Describe how humans use nonrenewable natural resources, such as oil, coal, natural gas, minerals, including metals			X		X			X			
		Grade 6	1. Recognize and compare how different parts of the world have varying amounts and types of natural resources and how the use of those resources impacts environmental quality.	6.A.1.a. Identify and describe natural resources as land, fossil fuels, forests, water, wind, minerals, wildlife			X	X	X			X	X		
				6.A.1.a. Identify and describe the distribution of natural resources around the Earth							X				
				6.A.1.c. Identify and describe how the natural change processes may be affected by human activities.			X		X		X	X			
				6.A.1.d. Identify and describe problems associated with obtaining, using, and distributing natural resources.			X	X			X	X			
				6.A.1.e. Identify possible solutions to problems associated with obtaining, using, and distributing natural resources.			X	X				X			
		Grade 7	1. Recognize and explain the impact of a changing human population on the use of natural resources and on environmental quality.	6.A.1.a. Based on data identify and describe the positive and negative impacts of an increasing human population on the use of natural resources								X			

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6. Environmental Science	B. Environmental Issues	Grade 4	1. Recognize and describe that people in Maryland depend on, change, and are affected by the environment.	6.B.1.a. Identify and describe that human activities in a community or region are affected by environmental factors including presence and quality of water, soil type, temperature, and precipitation.				X					X		
		Grade 5	1. Recognize and explain that decisions influencing the use of natural resources may have benefits, drawbacks, unexpected consequences, and tradeoffs.	6.B.1.a. Identify and describe personal and community behaviors that waste natural resources and/or cause environmental harm and those behaviors that maintain or improve the environment.			X		X		X	X			X
				6.B.1.b. Identify and describe that individuals and groups assess and manage risk to the environment differently.			X		X						
			2. Recognize and describe that consequences may occur when Earth's natural resources are used.	6.B.2.a. Explain how human activities may have positive consequences on the natural environment including with recycling centers, native plantings, and good farming practice.			X	X	X		X	X			
				6.B.2.b. Explain how human activities may have a negative consequence on the natural environment.			X	X	X		X	X			X
				6.B.2.c. Identify and describe that an environmental issue affects individual people and groups of people differently.			X								X
		Grade 6	1. Recognize and explain that human-caused changes have consequences for Maryland's environment as well as for other places and future times.	6.B.1.a. Identify and describe a range of local issues that have an impact on people in other places.											X
				6.B.1.b. Recognize and describe how environmental change in one part of the world can have consequences for other parts of the world.			X				X				
				6.B.1.c. Identify and describe that ecosystems can be impacted by human activities.			X	X	X		X	X		X	X
		Grade 7	1. Recognize and describe that environmental changes can have local, regional, and global consequences.	6.B.1.a. Identify and describe a local, regional, or global environmental issue.					X			X			
		Grade 8	1. Recognize and explain how human activities can accelerate or magnify many naturally occurring changes.	6.B.1.b. Identify and describe how human activities produce changes in natural processes: climate change, loss of habitat, hunting and fishing, introduction of nonnative species, cycling of matter					X			X			