

CURRICULUM

GUIDE

Science - Grade 8

Providence
Schools

Background

Providence Schools teachers and administrators worked collaboratively with consultants from the Charles A. Dana Center at the University of Texas at Austin to develop the mathematics and science curriculum frameworks. The curriculum frameworks encompass two critical questions:

- Content Standards that establish clearly defined expectations for all students, helping to answer the question, ***What do students have to learn?***
- Performance Standards that determine performance expectations for content standards, helping to answer the question, ***How well do the students have to learn it?***

The curriculum framework provides a work plan that directs the instruction delivered in every classroom in every school in the district. Instruction—the way the curriculum is presented to students—will focus on the needs of students.

Purpose and Use of Curriculum Guides

Curriculum Guides for the curriculum for each grade and subject outline the approximate number of days that each unit in the curriculum will be taught; describe the content to be learned; and list the essential questions that students should be able to answer by the end of the unit.

Parents should become familiar with the Curriculum Guides. You should know when your child is being taught different topics. You should also know the essential questions that your child should be able to answer by the end of each unit.

It is important that you understand that you do not have to be familiar with the content that your child is learning in order to help them with their studies. There are basic questions that you can ask to determine if your child understands the content.

Ask your child what she is learning in each subject
Does she understand the topic? Is the unit exciting or boring?
What specifically does she like or dislike about the topic?
Does she understand how the topic relates to the real world?

You know your child better than anyone. You will be able to tell if she or he is benefiting from the instruction and understanding the content of the material by the way they answer you. Speak to your child's teacher if you suspect there is a problem.

Ask your child about his assignments

What is the required work? Has he finished the work on time? Is he having difficulty? If he is having difficulty, why?

Encourage your child to talk to her teachers if she is having difficulty understanding a concept or completing an assignment. If your child continues to experience difficulty, speak to the teacher yourself so that the two of you can work together to support your child.

Even if you do not understand the content that your child is learning, the fact that you are showing interest in his or her school work and believe that it is important that he or she does well sends a powerful message.

Sharon Contreras
Chief Academic Officer
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SEMESTER A

Content students will be learning

Essential questions students should be able to answer by end of unit

Unit A.1 - Life Cycle of an Organism (5 days)

- Explain that organisms have roles that contribute to each other's survival.
- Understand that all living organisms have identifiable structures and characteristics.
- Identify how different structures/behaviors of an organism contribute to stability in the ecosystem.

- » How does the diversity of organisms contribute to the stability of the ecosystem?
- » What are some structures and behaviors that contribute to an organism's survival?

Unit A.2 - Components of an Ecosystem (4 days)

- Understand the difference between biotic and abiotic elements of an ecosystem.
- Identify biotic and abiotic factors in an ecosystem.
- Analyze how biotic and abiotic factors are interacting systems.
- Predict the outcome of a change in the biotic or abiotic factors of the ecosystem.

- » What are the characteristics of biotic and abiotic systems?
- » How do biotic and abiotic elements affect an ecosystem?
- » What are some examples of abiotic factors and their effect on the organisms in an ecosystem?

Unit A.3 - Comparing Ecosystems (5 days)

- Understand which biotic and abiotic factors affect a given ecosystem.
- Analyze how biotic and abiotic factors affect a given ecosystem.
- Explain how organisms interact given a change in their environment.

- » What are biotic factors that affect an ecosystem?
- » What are abiotic factors that affect an ecosystem?
- » How do biotic and abiotic factors affect an ecosystem?

Unit A.4 - Interdependence in Ecosystems (4 days)

- Explain that organisms have roles that contribute to each other's survival.
- Distinguish between biotic and abiotic factors that affect a given ecosystem.
- Understand how abiotic factors affect an ecosystem.
- Investigate and document the behavior of living organisms in an ecosystem.
- Explain a model that traces the flow of energy in a food web.

- » What are the functional roles and feeding relationships that constitute a food web?
- » What are the key abiotic factors and interactions in an ecosystem?
- » What are some major concerns in an ecosystem?

Unit A.5 - Energy Transformation (7 days)

- Understand the process of energy flow in an ecosystem.
- Explain the transfer of the sun's energy through living systems.
- Describe the basic process of photosynthesis.
- Interpret a model that traces the flow of energy in a food web.

- » How do organisms get energy needed for life?
- » How does photosynthesis make energy available to organisms?
- » How does energy move from one trophic level to another in an ecosystem?

Unit A.6 - Populations (6 days)

- Explain that organisms have roles that contribute to each other's survival.
- Analyze how biotic and abiotic factors affect populations in a given ecosystem.
- Explain the transfer of the sun's energy through living systems and its effect upon them.

- » How do biotic and abiotic factors in an environment limit a population?

SEMESTER A (CONTINUED)

Content students will be learning

Essential questions students should be able to answer by end of unit

UNIT A.6 - POPULATIONS (CONTINUED)

- Identify which biotic and abiotic factors affect a given ecosystem.
- Understand why biotic and abiotic elements could limit the size of a population in an ecosystem.

Unit A.7 - Analyzing Ecosystems (5 days)

- Explain how organisms with different structures and behaviors have specific roles in an ecosystem.
- Identify which abiotic factors affect a given ecosystem.
- Investigate and describe an ecosystem, including food webs and abiotic factors.

Unit A.8 - Adaptations in Animals (4 days)

- Understand that adaptations are specific to a role in an ecosystem.
- Understand how organisms have roles that contribute to each other's survival.
- Understand that genetic variations are passed on through random genetic changes.
- Understand how natural selection leads to evolution.
- Recognize that the characteristics of an organism result from interactions with the environment.

Unit A.9 - Basic Genetics (5 days)

- Understand that reproduction is a process that combines the genetic material of two parents to produce a new organism.
- Understand that reproduction is the fundamental process by which the new individual receives genetic information from parents.
- Explain how genetic variations are passed on through reproduction and random genetic changes.
- Learn the basic genetic mechanisms that determine the traits expressed by individuals in a population.

Unit A.10 - Natural Selection (5 days)

- Understand that genetic variations and traits of organisms are passed on through reproduction.
- Understand that environmental factors put selective pressure on populations.
- Explain how natural selection leads to evolution.
- Explain why members of a species are all the same kind of organisms and are different from all other kinds of organisms.

UNIT A.6 - POPULATIONS (CONTINUED)

- » What are population fluctuations in terms of limiting factors and feeding relationships?

- » What types of adaptations are specific to an ecosystem?
- » What factors make ecosystems different from each other?
- » In what ways do abiotic factors affect natural ecosystems?

- » How do adaptations help organisms survive in an environment?
- » How does a population change over time in response to environmental factors?
- » How do variations in a population help the population survive when the environment changes?

- » How are genetic variations passed on through reproduction?
- » Predict the phenotype of an organism given its genotype.

- » How does selective pressure affect the genetic makeup of a population?
- » How do the traits expressed by the members of a population change over time?
- » How does natural selection result in evolution?

SEMESTER B

Content students will be learning

Essential questions students should be able to answer by end of unit

Unit B.1 - Substances (5 days)

- Understand that an unknown substance can be identified by its properties.
- Classify substances using their characteristic properties.
- Explain how to compare characteristic properties (solid, liquid, gas, metal, and nonmetal) of substances.

- » What is a substance?
- » How can an unknown substance be identified?

Unit B.2 - Elements (4 days)

- Understand how to classify common elements and compounds.
- Interpret the symbols and formulas of simple chemical equations.
- Use symbols and chemical formulas to show simple chemical rearrangements.

- » What is an element?
- » How are elements grouped in the periodic table?

Unit B.3 - Behaviors of Gas (4 days)

- Measure the volume of a gas.
- Investigate the effect of compression on a gas.
- Describe the composition of a gas based on its individual particles.
- Study the composition of gas as particles in constant motion.

- » What is the behavior of a gas when a force is applied?
- » Describe the composition of gases.

Unit B.4 - Kinetic Energy (4 days)

- Explain the effect of increased heat energy on the motion of molecules.
- Explain the effect of decreased heat energy on the arrangement of molecules.
- Compare substances using characteristic properties.
- Understand the process of kinetic energy.

- » What happens to a substance when it is heated or cooled?
- » What is the process of expansion and contraction of a gas?

Unit B.5 - Energy Transfer (5 days)

- Understand the physical processes of evaporation and condensation.
- Describe the processes of evaporation and condensation in terms of energy transfer.
- Understand why energy is conserved.
- Explain why energy may be stored, transferred, or transformed.

- » What happens in energy transfer?
- » How do evaporation and condensation affect energy transfer?

SEMESTER B (CONTINUED)

Content students will be learning

Essential questions students should be able to answer by end of unit

Unit B.6 - Fusion (2 days)

- Explain the effect of decreased heat energy on the motion and arrangement of molecules.
- Understand that energy is needed to convert substances from one state to another.

- » Explain heat of fusion.
- » Why is there a discrepancy in energy transfer?

Unit B.7 - Phase Changes (6 days)

- Describe the changes of state in terms of molecular motion and conservation of mass.
- Understand the three ordinary changes of state.

- » What is a change of state?
- » What is phase change in terms of kinetic energy and energy transfer?

Unit B.8 - Solutions (5 days)

- Understand the process of dissolving.
- Investigate the amounts of solute and solvent needed in various solutions.
- Compare various solutions.

- » Explain the dissolving process.
- » What is a saturated solution?

Unit B.9 - Chemical Reactions (6 days)

- Understand how to interpret the symbols and formulas of simple chemical equations.
- Identify appropriate symbols and chemical formulas to show chemical arrangements.
- Explain chemical reaction as a process in which atoms rearrange to form new substances.

- » What is a chemical reaction?
- » What are the reactants and products in a chemical equation?

Unit B.10 - Reactants (5 days)

- Understand how reactants affect products.
- Understand that when substances undergo chemical changes to form new substances, the properties are different.
- Explain the concept of limiting factors in chemical reactions.

- » What is a limiting factor?
- » How does the quantity of reactants affect the quantity of product in a chemical reaction?



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