

BUNDLE COHERENCE OVERVIEW

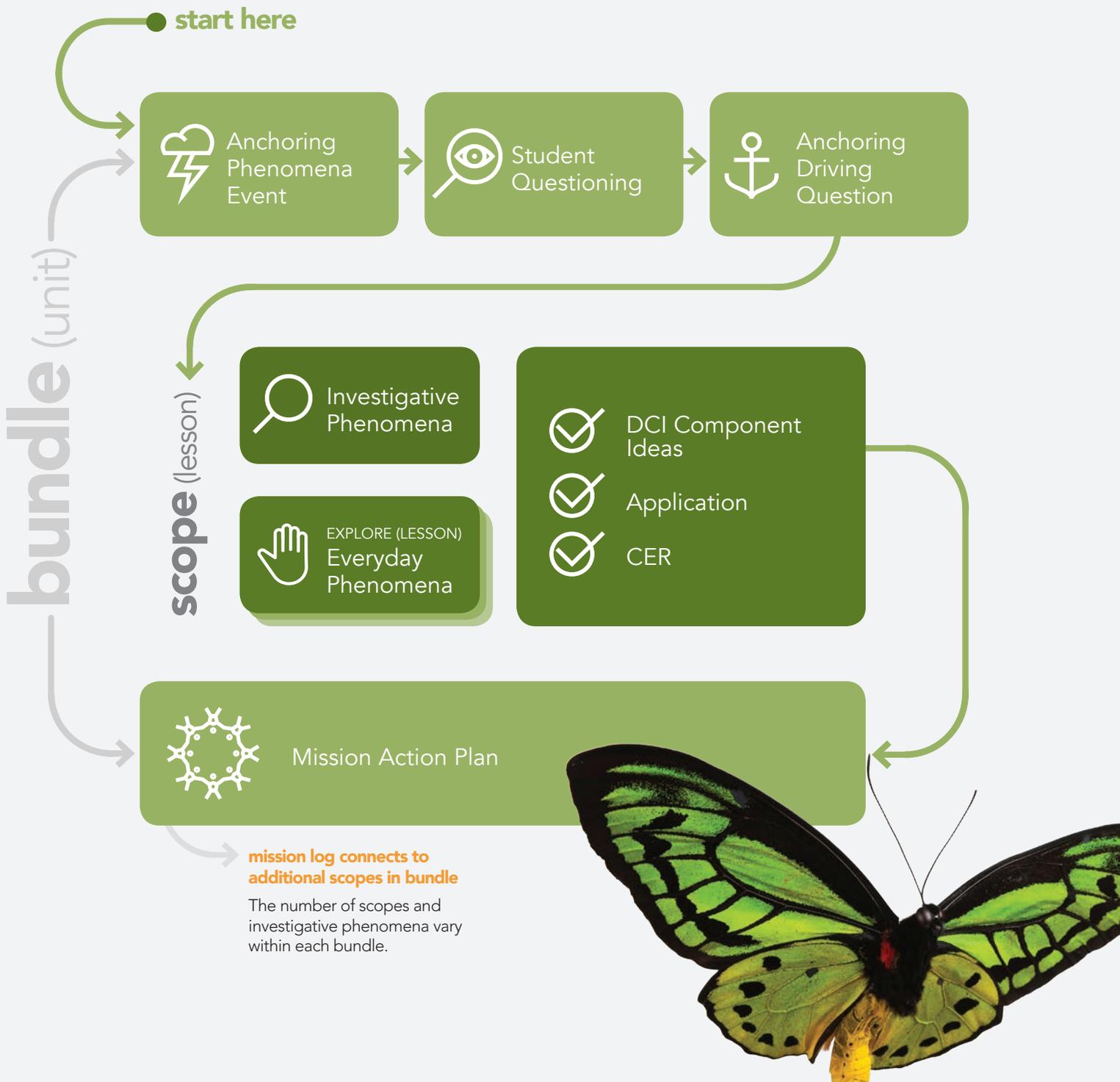
NGSS



NGSS 3D
STEMscopes™
K-12 SCIENCE

bundle coherence overview

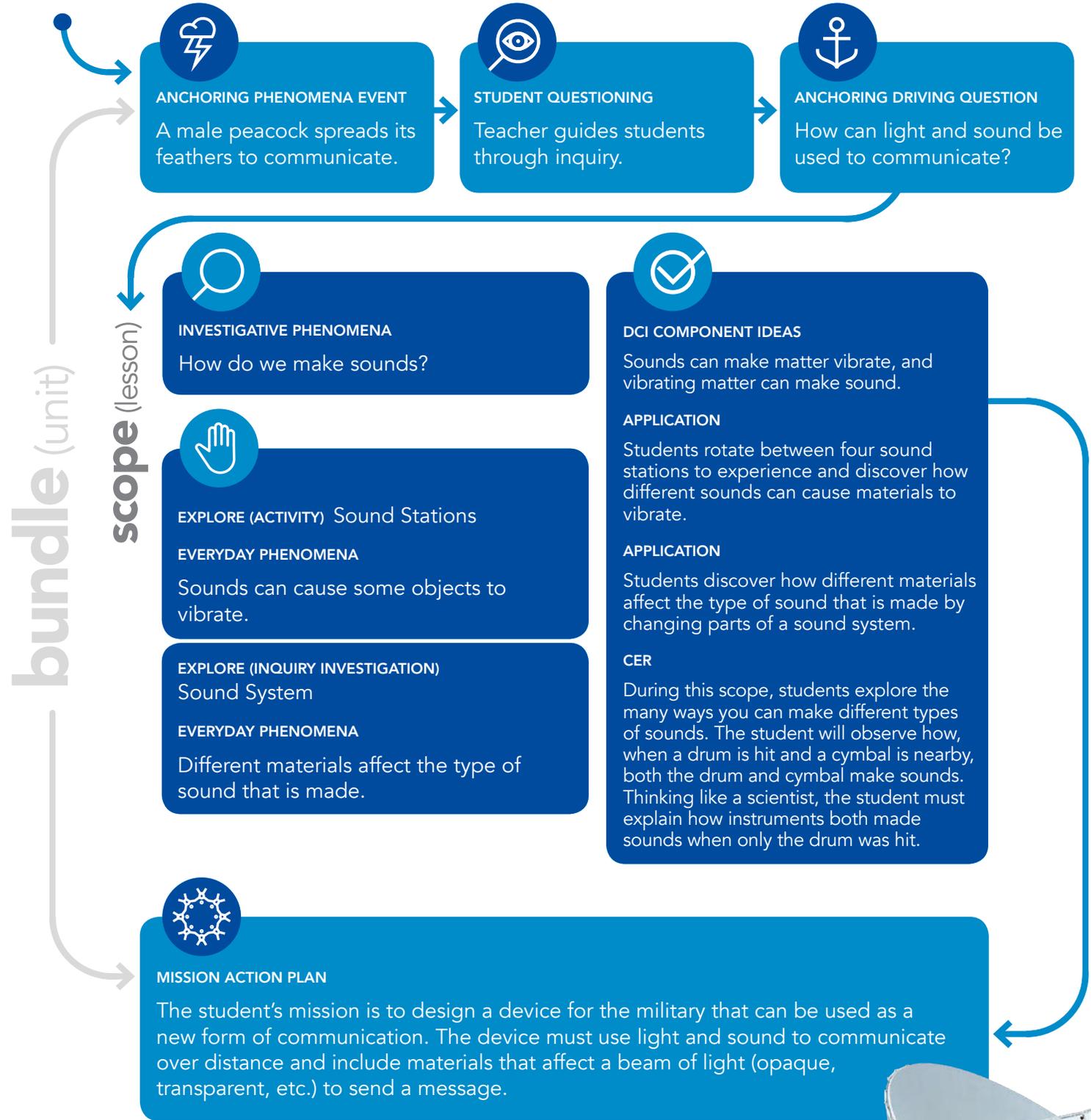
The STEMscopes bundle coherence flowchart shown below illustrates how a bundle (unit) and its scopes (lessons) are organized and work together. Each bundle begins with an anchoring phenomena event, anchoring phenomena driving question, and a mission action plan (performance expectation), which drive the instructional focus of each scope. Scopes (lessons) are tied to investigative and everyday phenomena, forming a bridge that builds students' knowledge progressively toward the bundle's anchoring event and driving question, and culminate in the mission action plan.



1st grade bundle 4

COMMUNICATING WITH LIGHT & SOUND
SCOPE: SOUND

start here



MISSION LOG CONNECTS TO ADDITIONAL SCOPES IN BUNDLE
Behavior of Light, Communication



4th grade bundle 4

COMMUNICATING USING WAVE ENERGY SCOPE: LIGHT REFLECTION

start here



ANCHORING PHENOMENA EVENT

A 360-degree view of the Grand Canyon creates a need to communicate using light and sound.



STUDENT QUESTIONING

Teacher guides students through inquiry.



ANCHORING DRIVING QUESTION

What system using light or sound to communicate could reach people over a distance?



INVESTIGATIVE PHENOMENA

How are we able to see things?



EXPLORE (ACTIVITY) Bull's-Eye!

EVERYDAY PHENOMENA

Light travels in a straight line, but can bounce (or reflect) off an object, allowing us to see the light as it enters our eyes.

EXPLORE (ACTIVITY) Let There Be Light!

EVERYDAY PHENOMENA

The amount of light on an object can impact what we actually see.

EXPLORE (ENGINEERING SOLUTION) Periscope

EVERYDAY PHENOMENA

Mirrors can help you see things you normally would not be able to see.



DCI COMPONENT IDEAS

An object can be seen when light reflected from its surface enters the eyes.

APPLICATION

Students investigate reflection and how light travels to reflect a light beam around the room as they attempt to hit a bull's-eye in the least amount of time.

APPLICATION

Students observe objects with and without light to determine which is easier to see.

APPLICATION

Students design and construct a model they use to see an object hidden behind a wall.

CER

During this scope, students investigated how we are able to see things with and without the presence of light. The student will examine a scenario where two boys are walking through a dark cave using a flashlight and one trips over a rock he did not see. Using scientific reasoning, the student must explain why the boy did not see the rock.



MISSION ACTION PLAN

The student's mission is to create a code with light or sound that will signal others in an emergency such as a fire, flood, hurricane, or tornado. In order to sell the device, the student must create a diagram with the system drawn and labeled showing how it works better than current methods to transmit information.

MISSION LOG CONNECTS TO ADDITIONAL SCOPES IN BUNDLE

Motion of Waves, Wavelength and Amplitude, Information Technologies

bundle (unit)

scope (lesson)

start here



ANCHORING PHENOMENA EVENT

Students are learning to use Morse code to communicate.



STUDENT QUESTIONING

Teacher guides students through inquiry.



ANCHORING DRIVING QUESTION

How are different types of waves used in technology and communication applications?



INVESTIGATIVE PHENOMENA

What are the properties of visible light?



EXPLORE (ACTIVITY) Simulating Light EVERYDAY PHENOMENA

Transparent materials impact a light's path and frequency impacts the colors of light.

EXPLORE (ACTIVITY) What Color is That? EVERYDAY PHENOMENA

Colored lights appear different when shining on different colored objects.

EXPLORE (SCIENTIFIC INVESTIGATION) Interactions of Light Waves EVERYDAY PHENOMENA

Visible light interacts with materials differently, resulting in reflection, absorption, or transmission.

EXPLORE (ENGINEERING SOLUTION) Lights Out EVERYDAY PHENOMENA

Materials can be designed to block outside light.

EXPLORE (TUVA) How Do Different Materials Affect Light Waves? EVERYDAY PHENOMENA

Different materials will impact how light is refracted.



DCI COMPONENT IDEAS

When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light. The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends.

APPLICATION

Students use a simulation program to model the light paths between transparent materials and the frequencies of different colors of light.

APPLICATION

Students explore how colored lights can appear different when shining on different colored objects.

APPLICATION

Students investigate interactions of visible light waves with various materials, such as reflection, absorption, and transmission.

APPLICATION

Students design and construct a window treatment that functions as a stylish and effective method of blocking outside light.

APPLICATION

Students create bar charts to explore relationships between various mediums and the refraction of light.

CER

During this scope, students have discovered the properties of visible light. The student will examine a scenario where four friends test the effects of using goggles to see a chart under water. The student will analyze the results from the friends' test and write a scientific explanation that describes the differences the friends found between wearing and not wearing goggles under water.

MISSION LOG CONNECTS TO ADDITIONAL SCOPES IN BUNDLE
Introduction to Properties of Waves, Modeling Waves Through Various Mediums, Modeling Light Waves, Digital vs. Analog Signals

bundle (unit)

scope (lesson)

MISSION ACTION PLAN

The student's mission, in the role of a salesperson, is to pitch a new product on the popular television show, *Making Life Easier*. The student will design a device that uses light waves to communicate. The sales pitch will include a visual, as well as an explanation, of how the device works, how it would make life easier, and the advantages of using light waves.





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