

Patterns, Scale and Structure: NGSS Crosscutting Concepts (Cubing)

Target Audience: Middle school and above

Objective: Explore three NGSS crosscutting concepts (Patterns/Scale/Structure) using exhibits.

Pre-assessment/Prior Knowledge: Prior to their visit, students should be familiar with the basic properties of natural objects (e.g. biological specimens) versus artifacts (e.g. cultural objects).

Activity Description: A cubing activity that explores three NGSS crosscutting concepts: *Patterns*; *Scale, proportion, and quantity*; and *Structure and function* through the framework of natural history (biological objects) and cultural history (archaeological exhibit). Varied grouping options can be used for this activity (e.g. small groups, peer partners) depending on student needs and chaperone ability.

Materials Needed:

- Student
 - Cubes
 - Paper and pencils (or flipchart paper and markers, whiteboards and dry erase markers)
- Teacher
 - Example Introduction/Discussion Questions
 - Cube labels (2)
 - Cube template

Suggested Pre-/Post-Visit Activity: Have students use the *Costa Rica Archaeology* exhibit activity (at biodiversity.ku.edu under Schools, Educator Resources) to organize the artifacts on display, and consider what information/patterns might be explored or communicated by different presentations.

Selected NGSS Crosscutting concepts (NGSS Lead States, 2013)

Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.

Scale, proportion, and quantity. In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.

Structure and function. The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.

Example Introduction/Discussion Questions

Patterns. How are objects organized, and why? How might they be presented differently to communicate different information? What similarities and differences are there between the presentation of biological specimens and artifacts, or preserved specimens and live organisms? What patterns do you observe between objects and exhibits?

Scale, proportion, and quantity. How might objects be thought of differently within the context of the entire museum or outside of it? What might be the same and different if a display was recreated as a model or diorama? What patterns might exist at different scales? Are there multiple examples?

Structure and function. How are the properties of objects communicated? What elements are visible and invisible? How could objects be reorganized to reflect different structural properties or function?

Exploring the KU Natural History Museum

Materials: Cube Labels

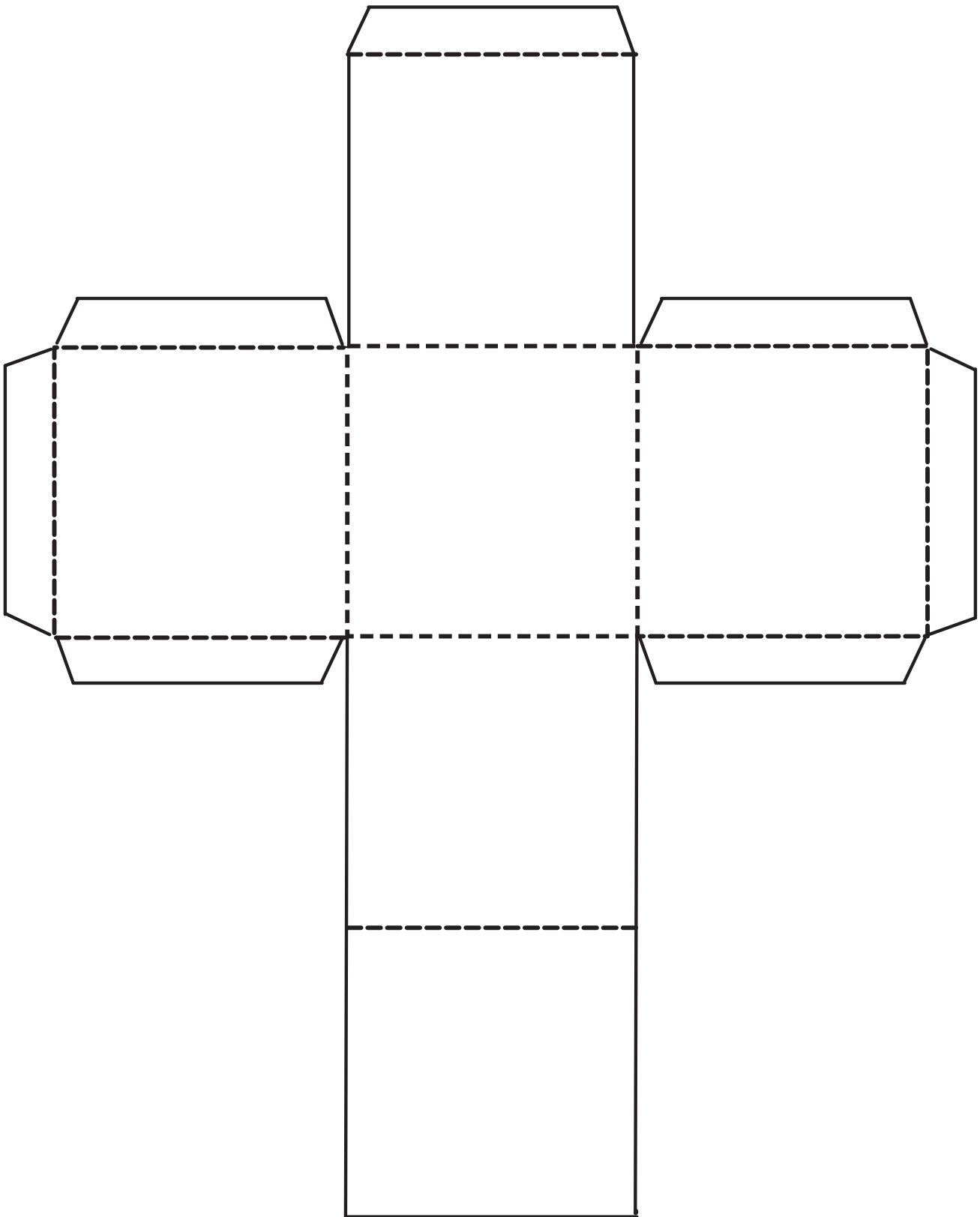
<p>DRAW <u>three</u> alternative ways to display a set of objects on exhibit</p>	<p>RECORD & COMPARE <u>three</u> variables related to objects on display as you move through an exhibit floor</p>	<p>DESIGN a diagram or chart to show <u>three</u> variables that distinguish the display of biological and non-biological objects</p>
<p>SKETCH an object on display and LABEL <u>three</u> properties you identify</p>	<p>WRITE a poem or song that describes a connection or link between <u>three</u> objects from different exhibits</p>	<p>CREATE a Venn diagram that depicts <u>three</u> similarities and <u>three</u> differences between two objects (can be from the same or different exhibits)</p>

<p>DRAW a diagram that depicts <u>three</u> convergent and <u>three</u> divergent properties of objects on display</p>	<p>PLOT changes in size or scale of objects within an exhibit or across several exhibits</p>	<p>CREATE a ruler or scale that could be used to measure/compare a property of objects you observe (e.g. size, color, texture)</p>
<p>TELL a story about why a set of objects is displayed the way it is</p>	<p>DRAW a human stick figure, and then MAP <u>three</u> objects on exhibit onto it</p>	<p>PRESENT an argument for depicting a set of objects on display in a different way</p>

Materials: Cube Template

Cube Pattern

Cut on solid lines - Fold on dashed lines



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