Inspired by Insects Lesson Set #1

What are the characteristics of an insect?

Objectives

- Identify insects through direct hands-on experiences
- Identify and classify insects by their external characteristics
- Compare and contrast insects with other insects
- Compare and contrast insects with arthropods

Materials Needed for Lesson 1

- Four Resin Specimen Kits
  - Arthropod Collection, Real Bug Insect Orders, Real Bug Insect Friends, Real Bug Insect Foes
- Science journal or notebook
- Pencil, colored pencils, crayons

Procedures

You and your class will use the specimens from the four resin specimen kits to learn how to identify various insects, as well as compare/contrast them with other specimens in the kits. Some of the specimens in the kits are not insects, they are other types of arthropods. Below is a brief overview from the *California Academy of Sciences* defining some of the characteristics of arthropods and insects.

Arthropods

Scientists classify animals according to how their bodies have evolved. Animals with similar characteristics are grouped together. **Insects** belong to a very large group of animals called **arthropods**. Spiders, crabs, centipedes, ticks, scorpions, shrimp, also belong to the arthropod group. The characteristic that defines an arthropod is an **exoskeleton**, or an external, jointed skeleton that provides structure and protection for the animal's softer insides. The plates of exoskeleton may overlap but have flexible joints in between, allowing' different body parts to move independently of the rest, much like animals with internal skeletons.

Defining Characteristics of Insects

Three Body Segments: All insects have segmented bodies. Insect bodies are divided into three segments – the **head**, the **thorax** and the **abdomen**. With some insects, it's difficult to tell exactly where one segment stops and another begins. But there is a fool-proof way to tell which part is which. First, look for the eyes and antennae; they're always located on the head. Next, locate the legs; they're always connected to the thorax. All that remains on the body is the abdomen, located on the opposite end as the head!

Six Legs: All adult insects have six legs. Insects who undergo complete metamorphosis (meaning they change from an egg to a larva to a pupa to an adult) lack legs entirely during the first phases of their lives. By looking at an insect's legs, you can usually tell what type of environment it lives in. For example, many insects that live in the water, such as water boatmen, have flattened oar-like legs to help them paddle through the water. Other insects may have legs suited for running, or climbing, or jumping great distances.

Antennae: Adult insects also come equipped with a pair of sensitive antennae on their heads. These sensory organs are used to feel, smell, and sometimes hear. Antennae come in a wide range of shapes and sizes, depending upon how they are used. Scientists use antennae to help identify different types of insects because they are very particular to individual species of insects.

Wings: All but our most "primitive" orders of insects possess wings. Even in ants and termites the reproductive members of the colony possess wings. Typically, insects have two sets of wings that move together in unison. In beetles, the front

pair of wings has been modified to form a protective casing for the hind wings called elytra. True flies appear to have only two wings. This is because the hind wings have been modified into halteres, which resemble small knobbed structures that act as a counterweight to the front wings, helping stabilize the insect's flight.

Extension Options

An authentic way to connect literacy with this activity is by having students use science notebooks. Writing skills that are likely taught during literacy instruction can be reinforced and modeled during this activity by using a science journal, such as choosing and developing strategies for organized writing, procedural writing, drawing labeled sketches, and making bulleted lists. Scientists keep notebooks of their work because their notebooks are essential for their work. For students to understand the essential role of notebooks in science, they must use notebooks authentically, purposefully and consistently throughout their academic experiences. A great resource for learning more about science notebooks for elementary students is the book titled *The Essentials of Science and Literacy: A Guide for Teachers* written by Karen Worth, Jeff Winokur, and Sally Crissman.

Pennsylvania Academic Standards

Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Pennsylvania Standards for Science and Technology and Engineering - 3.1 Biological Sciences					
3.1.B. Biological Sciences					
3.1.K.A1 Identify the similarities and differences of living and nonliving things.	3.1.1.A1 Categorize living and nonliving things by external characteristics.	3.1.2.A1 Intentionally Blank	3.1.3.A1 Describe characteristics of living things that help to identify and classify them.	3.1.4.A1 Classify plants and animals according to the physical characteristics that they share.	3.1.5.A1 Intentionally Blank
English Language Arts Standards					
1.4 Writing					
CC.1.5.K.A Participate in collaborative conversations with peers and adults in small and larger groups.	CC.1.5.1.A Participate in collaborative conversations with peers and adults in small and larger groups.	CC.1.5.2 Participate in collaborative conversations with peers and adults in small and larger groups.	CC.1.5.3.A Engage effectively in a range of collaborative discussions on grade level topics and texts, building on others' ideas and expressing their own clearly.	CC.1.5.4.A Engage effectively in a range of collaborative discussions on grade level topics and texts, building on others' ideas and expressing their own clearly.	CC.1.5.5.A Engage effectively in a range of collaborative discussions on grade level topics and texts, building on others' ideas and expressing their own clearly.
1.5 Speaking and Listening					
CC.1.5.K.A Participate in collaborative conversations with peers and adults in small and larger groups.	CC.1.5.K.A Participate in collaborative conversations with peers and adults in small and larger groups.	CC.1.5.K.A Participate in collaborative conversations with peers and adults in small and larger groups.	CC.1.5.K.A Participate in collaborative conversations with peers and adults in small and larger groups.	CC.1.5.K.A Participate in collaborative conversations with peers and adults in small and larger groups.	CC.1.5.K.A Participate in collaborative conversations with peers and adults in small and larger groups.

Inspired by Insects Lesson Set #2

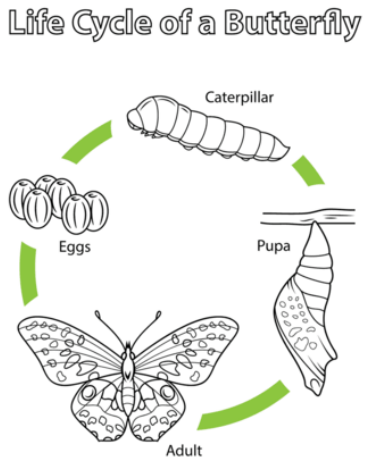
Life cycle of a butterfly

Objectives

- Describe the stages of a butterfly
- Identify patterns in the life cycle of a butterfly
- Represent and interpret data collected

Materials Needed for Lesson 2

- Six sets of plastic models of *Life Cycle of a Monarch Butterfly*
- Supporting Texts
    - Non-fiction: *A Butterfly's Life*, *The Life Cycles of Butterflies*
    - Fiction: *Gotta Go! Gotta Go!*, *velma gratch & the way cool butterfly*
- Science journal or notebook
- Pencil, colored pencils, crayons



Procedures

You and your class will use the supporting texts and plastic models of the four stages of a monarch butterfly to learn about the sequence of events (chronology) that take place in the life cycle of a monarch butterfly. Two texts are non-fiction informational texts and two texts are fictional texts, but provide similar information about butterflies, such as the correct order of the four stages of a butterfly's life cycle and butterfly migration. Students can use their science notebooks to record information and draw labeled sketches to describe the four stages of a butterfly based on the information that they gathered from the various texts that they read. A great literacy connection is having students describe the order of events that take place in the books, especially with the life cycle of a butterfly. You can also have students compare/contrast the different texts to draw on information from multiple texts.

Four stages of a butterfly are: Egg → Caterpillar → Pupa (Chrysalis) → Adult (Butterfly)

Extension Options

An authentic extension for this lesson is to raise butterflies in the classroom. For this activity you will need the following resources:

- Live Monarch eggs and caterpillars: http://www.monarchs-and-milkweed.com/
- RESTCLOUD Insect and Butterfly Habitat Cage Terrarium Pop-up 12 x 12 x 12 inches (found on Amazon)
- Milkweed plants for live caterpillars: http://www.monarchs-and-milkweed.com/

For mathematics activities students can participate in several activities, especially in participating in collecting data from live butterflies as they transition through their life stages in the classroom, or outside in a garden or natural setting. Students can record data, such as charting stages of the butterfly weekly or monthly on a calendar then transferring it to a bar graph. See additional pages for extension activities, such as life cycle sequences, calendars, and charts.

Other connections with the literacy standards can be having students retell and explain key details from a text, use various text features and structures to interpret information, determine cause/effect and problem/solution in texts.

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English Language Arts Standards					
1.2 Reading Informational Texts					
CC.1.2.K.A With prompting and support, identify the main idea and retell key details of text.	CC.1.2.1.A Identify the main idea and retell key details of text.	CC.1.2.2.A Identify the main idea of a multiparagraph text as well as the focus of specific paragraphs within the text.	CC.1.2.3.A Determine the main idea of a text; recount the key details and explain how they support the main idea.	CC.1.2.4.A Determine the main idea of a text and explain how it is supported by key details; summarize the text.	CC.1.2.5.A Determine two or more main ideas in a text and explain how they are supported by key details; summarize the text.
CC.1.2.K.C With prompting and support, make a connection between two individuals, events, ideas, or pieces of information in a text.	CC.1.2.1.C Describe the connection between two individuals, events, ideas, or pieces of information in a text.	CC.1.2.2.C Describe the connection between a series of events, concepts, or steps in a procedure within a text.	CC.1.2.3.C Explain how a series of events, concepts, or steps in a procedure is connected within a text, using language that pertains to time, sequence, and cause/effect.	CC.1.2.4.C Explain events, procedures, ideas, or concepts in a text, including what happened and why, based on specific information in the text.	CC.1.2.5.C Explain relationships or interactions between two or more individuals, events, ideas, or concepts in a text based on specific information in the text.
CC.1.2.K.E Identify parts of a book (title, author) and parts of a text (beginning, end, details).	CC.1.2.1.E Use various text features and search tools to locate key facts or information in a text.	CC.1.2.2.E Use various text features and search tools to locate key facts or information in a text efficiently.	CC.1.2.3.E Use text features and search tools to locate and interpret information.	CC.1.2.4.E Use text structure to interpret information (e.g., chronology, comparison, cause/effect, problem/solution).	CC.1.2.5.E Use text structure, in and among texts, to interpret information (e.g., chronology, comparison, cause/effect, problem/solution).
Pennsylvania Core Standards for Mathematics					
Measurement and Data					
CC.2.4.K.A.4 Classify objects and count the number of objects in each category.	CC.2.4.1.A.4 Represent and interpret data using tables/charts.	CC.2.4.2.A.4 Represent and interpret data using line plots, picture graphs, and bar graphs.	CC.2.4.3.A.4 Represent and interpret data using tally charts, tables, pictographs, line plots, and bar graphs.	CC.2.4.4.A.4 Represent and interpret data involving fractions using information provided in a line plot.	CC.2.4.5.A.4 Solve problems involving computation of fractions using information provided in a line plot.

Life cycle of a butterfly

Directions: Cut and paste the life cycle of a butterfly into the correct order, then write the steps.

First,

Paste Here

Next,

Paste Here

Then,

Paste Here

Last,

Paste Here

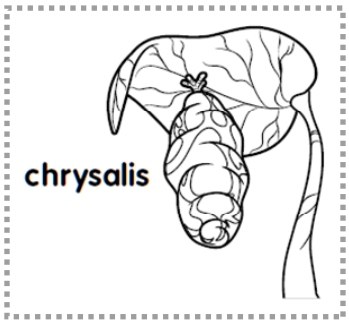
Write a few sentences about the life of a butterfly.

First, _____

Next, _____

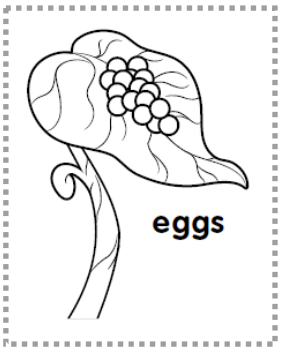
Then, _____

Last, _____


chrysalis

butterfly

caterpillar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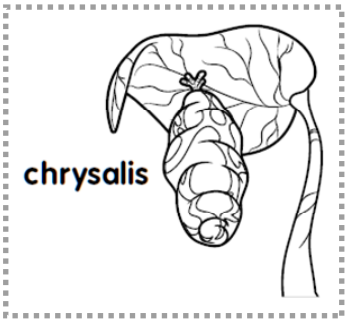
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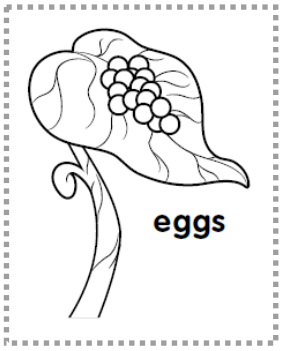
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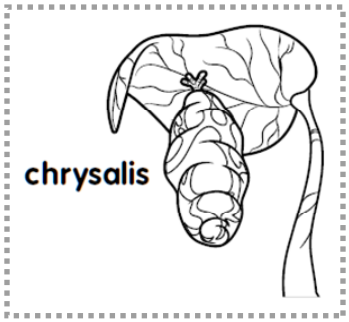
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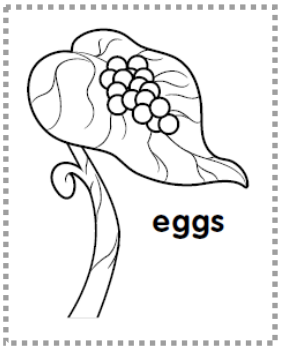
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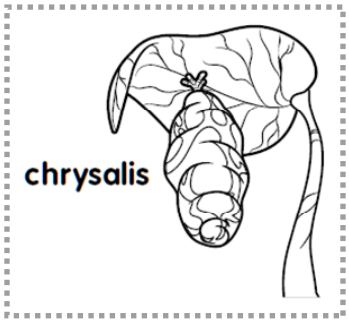
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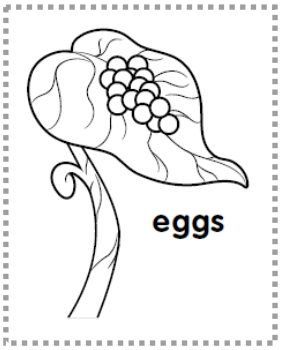
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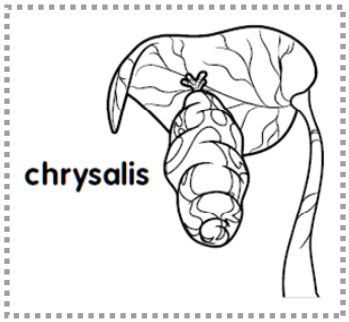
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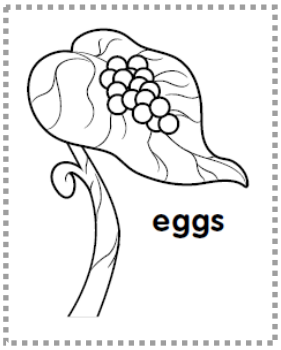
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Life cycle of a butterfly calendar activity

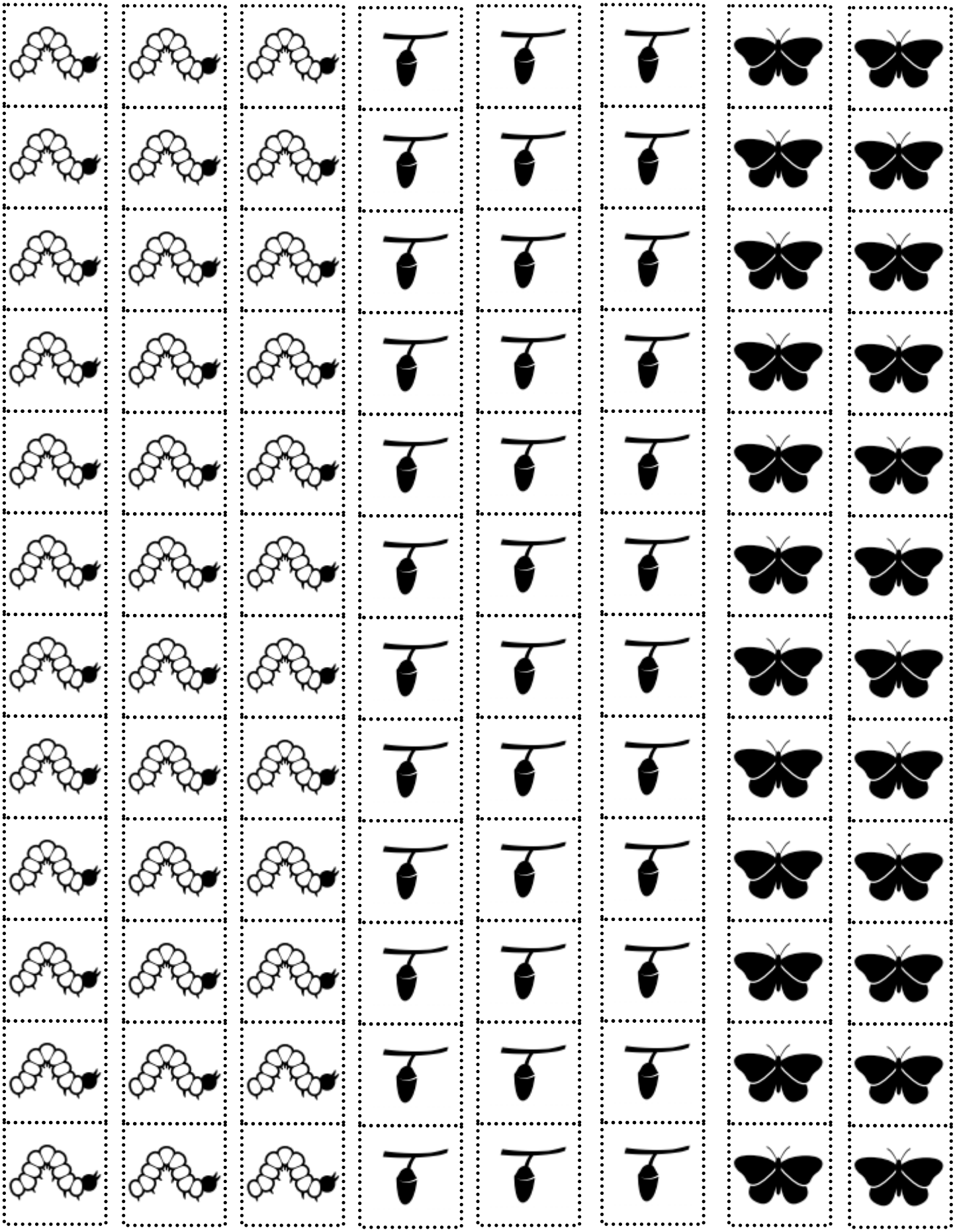
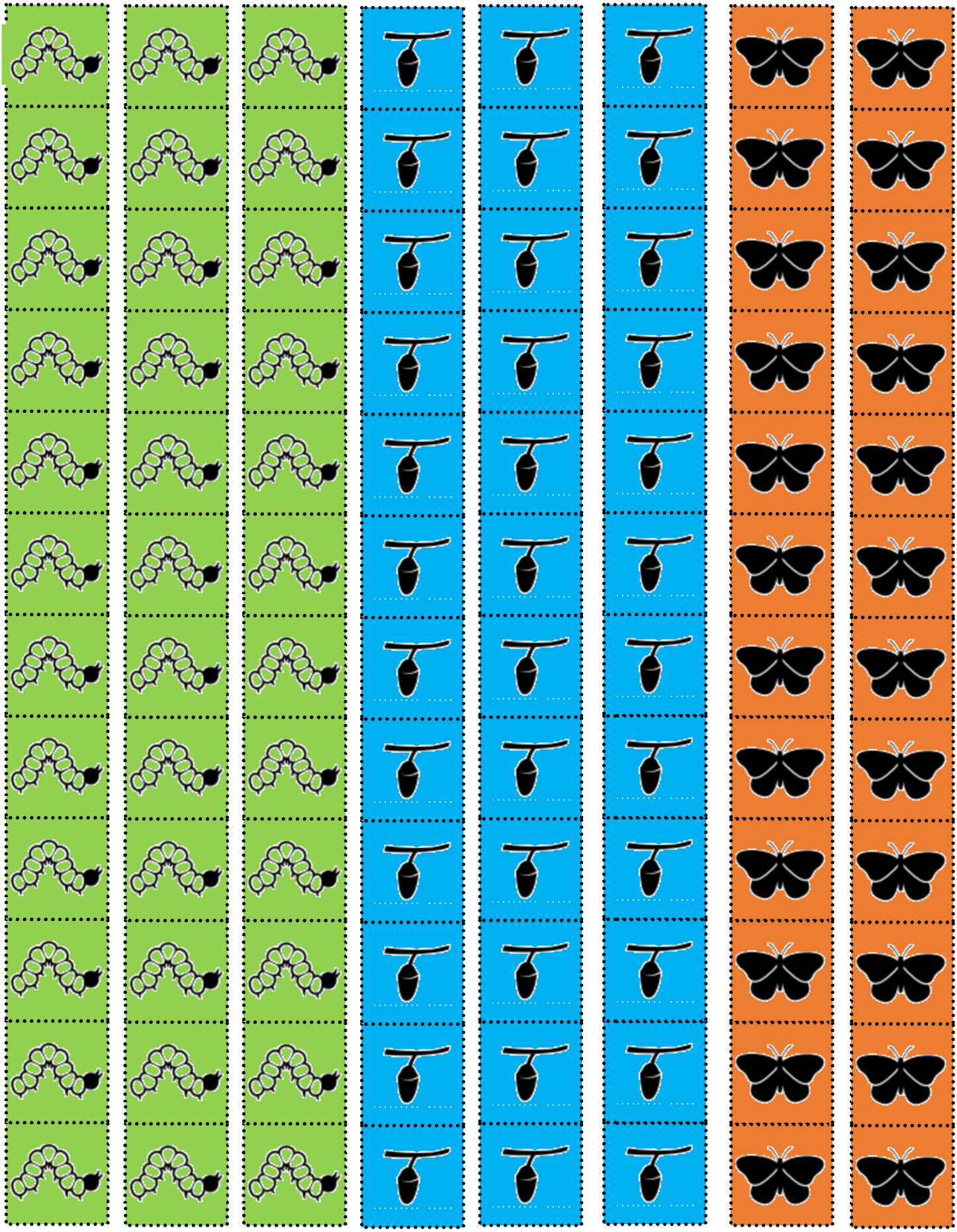
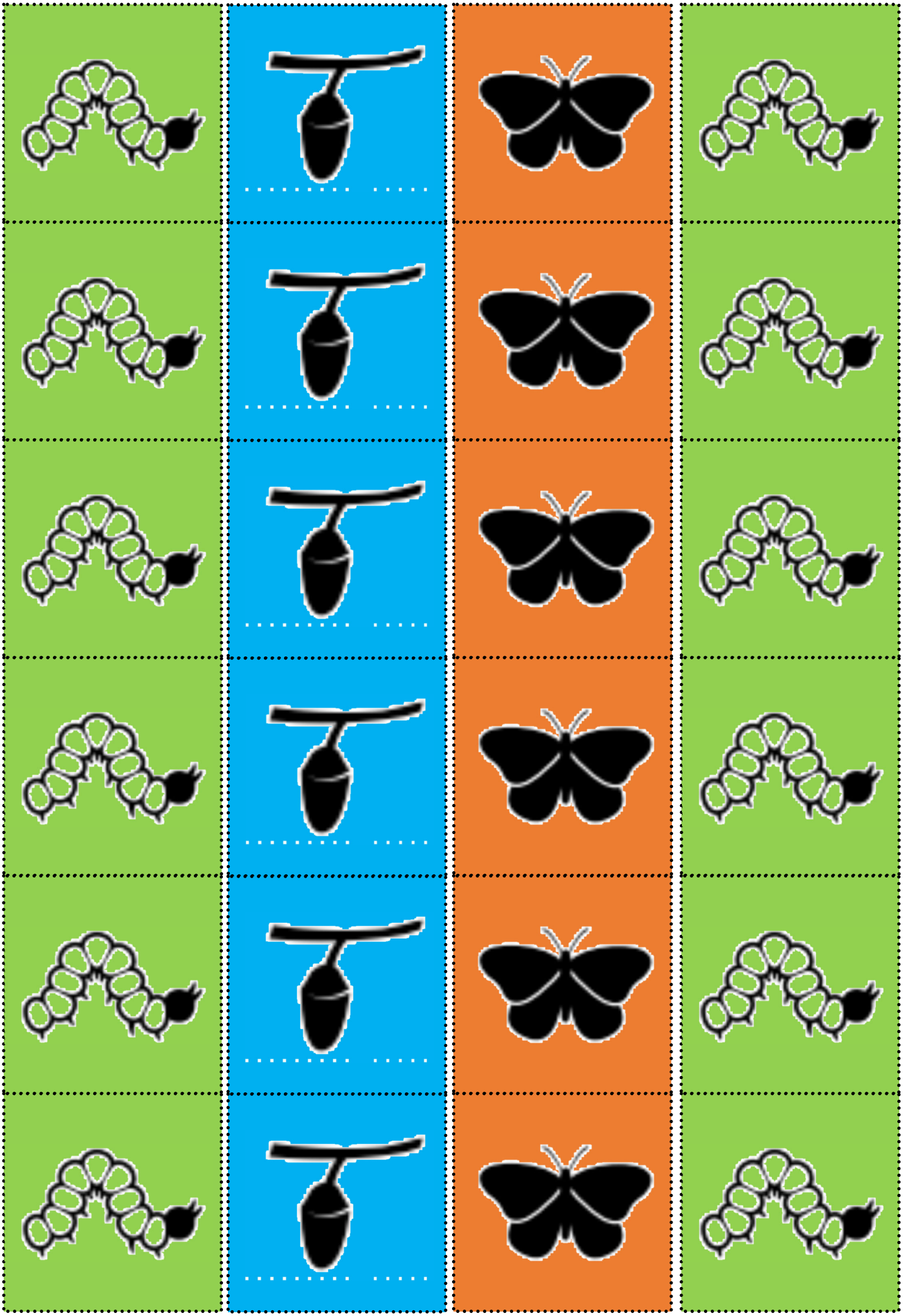
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

BUTTERFLY CALENDAR: Collecting data about butterflies

What stage of the life cycle of a butterfly did you observe today?

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Representing our data about butterflies

Graphing Activity: What stage of the life cycle of a butterfly did you observe today?

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3					**3**
2					**2**
1					**1**
day	**Caterpillar**	**Chrysalis**	**Butterfly**	**Egg**	**day**