

## Virtual Summer Camp: STEM Explorers

### Week 4—Pollination Station

This Week:

Discover native species live from our Habitat Garden,  
Build a butterfly feeder, craft your own butterfly and more!

Friday-Monday: [Review & Prep!](#) Read through the packet and gather your materials.

Tuesday: [Tune in! Watch](#) our educators lead a live demonstration at 2pm.

Wednesday: [Experiment & build!](#) Follow the activity instructions in your packet.

Thursday: [Share Your Results!](#) Submit a photo of your results to [education@hrpt.ny.gov](mailto:education@hrpt.ny.gov) to be featured on our website. Then, download next week's packet!

# VIRTUAL SUMMER CAMP: STEM EXPLORERS

## Week 4- Pollination Station

### Materials Checklist

#### Life of a Butterfly:

- ☐ Monarch Butterfly Life Cycle Worksheet
- ☐ Butterfly Anatomy Worksheet
- ☐ Basket coffee filter or circular paper (approx. 10-inch diameter)
- ☐ Clothespin, toilet paper tube or popsicle stick
- ☐ Markers or paint
- ☐ (4) 12-inch pipe cleaners, wire or foil
- ☐ Tape
- ☐ Sharpie or pen
- ☐ Pipe cleaners
- ☐ Tissue paper
- ☐ Glitter glue or other decoration materials (optional)
- ☐ Spray bottle with water (optional)

#### Simple Syrup:

- ☐ 9 tablespoons of sugar
- ☐ 9 tablespoons of water
- ☐ Pot or saucepan

#### Butterfly Feeder:

- ☐ Slice of fresh orange
- ☐ Pipe cleaners
- ☐ 1 wooden skewer
- ☐ Tape or glue
- ☐ Hole puncher
- ☐ Scissors
- ☐ Sponge or cotton balls
- ☐ Recycled jar or cup (approx. 16-24oz)
- ☐ Jute twine or yarn (optional)
- ☐ Food coloring (optional)
- ☐ Artificial or paper flowers (optional)

# VIRTUAL SUMMER CAMP: STEM EXPLORERS

## Life of a Butterfly

**Theme:** Butterflies; Life Cycles; Insect Anatomy; Form and Function

**Ages:** 10-14 years old

**Prep Time:** 5 minutes

**Activity Time:** 20-30 minutes

### Activity Summary:

Hudson River Park is home to a variety of butterflies within its four miles of lush plant beds and gardens. Monarch butterflies in particular are seen throughout the summer and early fall especially in the Park's native plant Habitat Garden, a monarch butterfly waystation. Monarchs are a unique species in that they migrate thousands of miles south every fall to escape cold temperatures. Additionally, the caterpillars rely solely on the milkweed plant for nutrients and survival. This lesson breaks down the life cycle of a butterfly and invites young students to reenact each stage. Students will also review the general anatomy of a butterfly and craft their own butterfly using common household items.

### Objectives:

- Students will identify the four stages of a butterfly's life cycle
- Students will identify the basic anatomy of a butterfly

### Lesson Materials:

- Monarch Butterfly Life Cycle worksheet
- Butterfly Anatomy worksheet

### Lesson Procedure:

#### 1- The Butterfly Life Cycle

*Educator Note: Use the Butterfly Life Cycle Wheel worksheet as a guide or use a blank sheet of paper to complete this activity. Let the student begin by naming the first stage of life (egg) and draw each proceeding stage as described below in a clockwise direction with arrows connecting each stage. Afterwards, review each stage by acting out what each stage looks like with the student. Have colorful scarves and a blanket or sheet handy.*

Butterflies have a unique life cycle. Can you tell me what a life cycle is? (The different stages in an organism's life) or What are the different stages that make up our life cycle? (Embryo- or in our mom's tummy, baby, kid/teenager, adult) From Baby to Adult, humans grow and get bigger, but our body parts stay pretty much the same—we have a head, torso, two arms and legs, hands and feet, etc. Butterfly stages of life are very different! Monarch butterflies are found in Hudson River Park during the warmer months as a stopover habitat during their migratory journey between Mexico and Canada.

First, they start out as an **egg**. Monarchs lay their eggs exclusively on milkweed plants and about four days later, they hatch.

After they hatch, they become a larva, or a **caterpillar**. The baby caterpillar eats the milkweed plant it hatched on, so that it can gain strength for its next phase. Milkweed tastes bitter and unpleasant to most other animals; eating milkweed is a defense strategy for Monarch caterpillars because it makes them taste bitter too!

About two weeks after hatching, the larva is strong enough to mature, and it becomes a pupa, or **chrysalis**. This means the caterpillar is ready to find a safe place on the underside of a milkweed leaf to attach itself and begin the process of metamorphosis. Using silk, the caterpillar will attach to the base of a stem or a leaf and create a casing around its body called a chrysalis. For ten days it might look like nothing is happening but this is actually the phase where the most change occurs. Inside the chrysalis, the caterpillar is transforming into a butterfly, a process called metamorphosis.

After this remarkable change of metamorphosis happens inside the chrysalis, the adult **butterfly** is ready to emerge! The butterfly exits the chrysalis looking remarkably different, with bright colorful wings and a long slender body shape.

# VIRTUAL SUMMER CAMP: STEM EXPLORERS

Now that we know all of the stages, let's act out each stage with our bodies! What does a butterfly egg look like? They are really small and round like a ball, let's crouch down turn into an egg that is waiting to hatch on a leaf. What happens after a few days? That's right, we hatch out of our eggs and crawl like a caterpillar. We have to eat lots of milkweed leaves to grow big and strong. Now that we've grown, we are ready for the next stage, what is it? The chrysalis! Let's wrap ourselves into a sheet or blanket while we go through the process of metamorphosis. Next, with colorful scarves as wings, we can finally emerge as a beautiful, adult butterfly and spread our wings!



## 2- Learning Butterfly Anatomy

*Educator Note: Start with the Butterfly Anatomy worksheet or by drawing a slender oval on paper. Let the student name a particular part of a butterfly, discuss its function, then label and color on the worksheet or draw onto the oval. Help guide them to add all of the body parts listed below and use clues to guess and discuss the function of each part. To see where each body part should be placed, view the Butterfly Anatomy Worksheet Answer Key.*

**Head:** there are different features on the head

- **Antenna** for feeling
- **Compound eyes** (creating many different images that the butterfly can process all at once) for seeing from different angles at once. Students hold up a finger about a foot in front of their face and close one eye and then the other- demonstrating how we process two images. Then explain that butterflies have this but up to 17,000 times more!
- **Proboscis** or straw like mouth for sucking up nectar
- **Thorax:** the chest/torso
- **Legs** (three on each side) for stabilizing when landing on a flower or leaf
- **Wings** for flying, camouflaging and retaining heat
- **Abdomen:** this is where the butterfly's heart and most of the digestive system is located

*Sample Narrative to teach:*

This is my friendly butterfly – but does it look like a butterfly? No, this poor butterfly is missing all of its parts! Can you think of some body parts that it's missing so we can help? (Student starts to name body part) Great the butterfly needs eyes! A butterfly has compound eyes, let's label and color in the compound eyes together on our worksheet. Why doesn't a butterfly have just two eyes like humans? (To see from different directions all at once).

# VIRTUAL SUMMER CAMP: STEM EXPLORERS

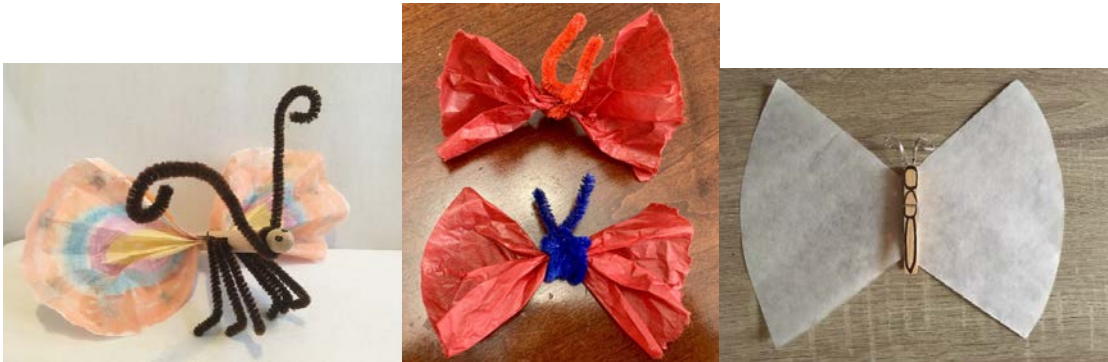
*Educator Note: After adding all of the body parts to the butterfly, you can also use the Butterfly Anatomy Worksheet Answer Key to extend learning and recap these new vocabulary words.*

## 3- Make your own Butterfly!

*Educator Note: Putting together the knowledge of butterfly anatomy, it's time to make your own using common craft items you have at home! Feel free to use alternative materials to construct and decorate your butterfly.*

- Step 1: Color the coffee filter with markers, paint, water colors etc. to decorate the “wings.” Optional: gently spray water and watch the colors from the marker soften and merge together, then let dry.
- Step 2: Once dried, fold the coffee filter in alternating 1-inch sections to create a fan-like effect.
- Step 3: On the “head” of the clothespin, draw compound eyes with marker or a pen. Outline or color sections of the head, thorax and abdomen. If you don’t have a clothespin, try using a bag clip, toilet paper tube or popsicle stick.
- Step 4: Pinch the center of the folded coffee filter and insert into the clothespin. Gently unfold the coffee filter on each side of the clothespin.
- Step 5: Cut pipe cleaner into 3, 6-inch pieces and keep one 12 inch pipe cleaner to the side. Clip the clothespin at the center of the three pieces of pipe cleaner and bend them downward to make “legs.” Secure with tape as needed.
- Step 6: Wrap the 12 inch pipe cleaner around the base of the “head” and curl the ends on each side to create “antennae.”

Craft Examples:



## 4- Sing a Song – Head, Thorax, Abdomen!

*Educator Note: Sing to the tune of the “Head, Shoulders, Knees and Toes” theme song and review the parts of the butterfly by miming through the words!*

Head, thorax, abdomen, abdomen,

Head, thorax, abdomen, abdomen,

Compound eyes, antenna, and six legs,

Head, thorax, abdomen, abdomen!

# VIRTUAL SUMMER CAMP: STEM EXPLORERS

## Butterfly Feeder and Pollination

**Theme:** Habitat Garden; Pollination; Hudson River Geography

**Ages:** 5-12 years old

**Prep Time:** 5 minutes

**Activity Time:** 40 minutes

### Activity Summary:

Hudson River Park is home to a variety of butterflies within its four miles of lush plant beds and gardens. A common butterfly species seen throughout the summer and early fall is the Monarch butterfly. They can be spotted in the Park's native plant Habitat Garden, the monarch butterfly waystation. This lesson breaks down the butterfly pollination process, while inviting students to observe how butterflies move pollen between plants. Students will create a butterfly feeder to encourage butterflies to visit their garden, while observing any other species it may attract.

### Objectives:


- Students will observe and describe the feeding activity of butterflies, insects and other species
- Students will learn and observe how pollinators feed
- Students will describe the importance of pollinators and their role in the ecosystem

### Experiment Materials:

- Slice of orange
- Pipe cleaners (opt for vibrant colors that are most likely to attract butterflies, such as pinks, reds, yellows, oranges and blues)
- 1 wooden skewer
- Tape or glue
- Hole puncher
- Scissors
- Food coloring (optional)
- Recycled jar or cup (approx. 16-24oz)
- Jute twine or yarn (optional)
- Sponge or cotton balls
- Silk/artificial flowers
- Artificial/silk butterfly (optional - if you do not want to use artificial butterflies you can make your own!)

### Simple Syrup (Sugar Water) Materials:

*Note: this requires adult supervision, if you do not want to make simple syrup you can buy a bottle of simple syrup*

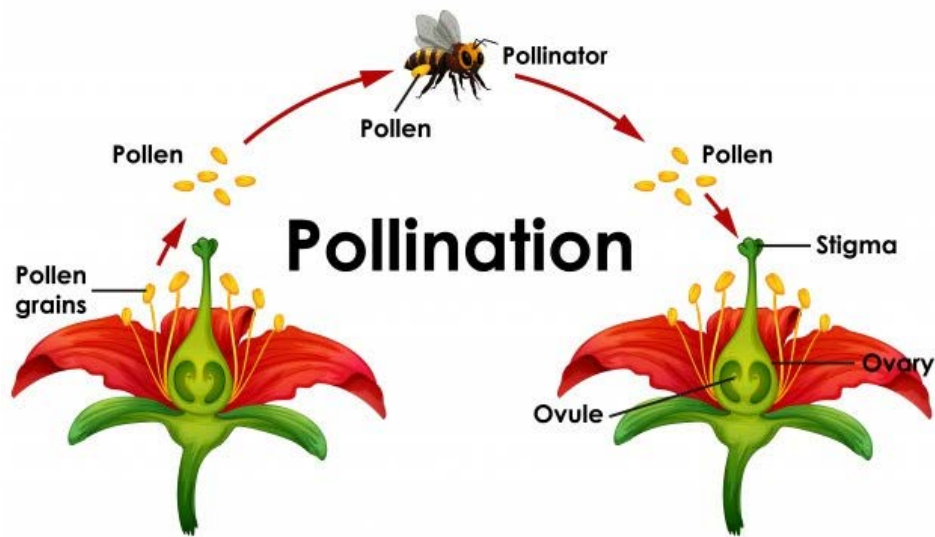
- 9 tablespoon of sugar
  - 9 tablespoons of water
  - Saucepan/pot to boil ingredients
- 

# VIRTUAL SUMMER CAMP: STEM EXPLORERS

## Lesson Procedure: Butterfly Feeder and Pollination

### 1- Background Information: Pollination

The life cycle of plants depends on **pollination** as it allows for plants to make seeds and continue reproduction (have babies). Pollination is the process of pollen grains being transferred to the male anther of a flower to the female stigma. **Pollen** are tiny grains produced by the stamens of flowers that fertilize the seeds. First, a pollen grain falls onto the stigma. Second, the insect enters the flower and brushes against the anther coating itself in pollen. Third, some pollen may fall onto the stigma as the insect leaves the flower. Fourth, the insect continues this process from flower to flower. Fifth, a small seed forms in the ovary in the plant.



Pollination can occur with the help of many insects, but also with the help of the wind or rain. Wind or rain can carry the pollen from flower to flower, but the weather will always vary. Since wind or rain is not a reliable source of pollination, insect pollinators are essential to carry out pollination and maintain a balanced ecosystem. Butterfly pollination is important as butterflies have a highly developed sense of smell that allows them to visit scented flowers. Butterfly pollination begins as butterflies pick up pollen on their bodies when they travel from flower to flower. Butterflies tend to travel longer distances thus ensuring sufficient coverage of equal portions of flowering plants in larger flower bed areas.

Butterflies are an important part of our ecosystem as they are one of nature's many pollinators. Butterflies are among one of the most common pollinators, followed by bees, wasps, moths, beetles, and more. Butterflies typically visit clustered flowers that are flat as they provide a landing pad that allows for simpler nectar probing. **Nectar** is a sugar-rich liquid secreted by plants (primarily flowers) which ultimately attracts butterflies and other insects that pollinate the flowers. Butterflies have a weak sense of smell, however they have a complex color vision that allows them to see ultraviolet or colors within the red spectrum. This is why butterflies typically visit clustered flowers that are brightly colored (red, orange, yellow).

# VIRTUAL SUMMER CAMP: STEM EXPLORERS

## 2- Flower Anatomy:

Flowers are made up of a variety of different parts. Some flowers may have all male parts, all female parts or a combination of both parts!

Male parts: the **stamen** is a key indicator of a male part of a flower. It is composed of two parts:

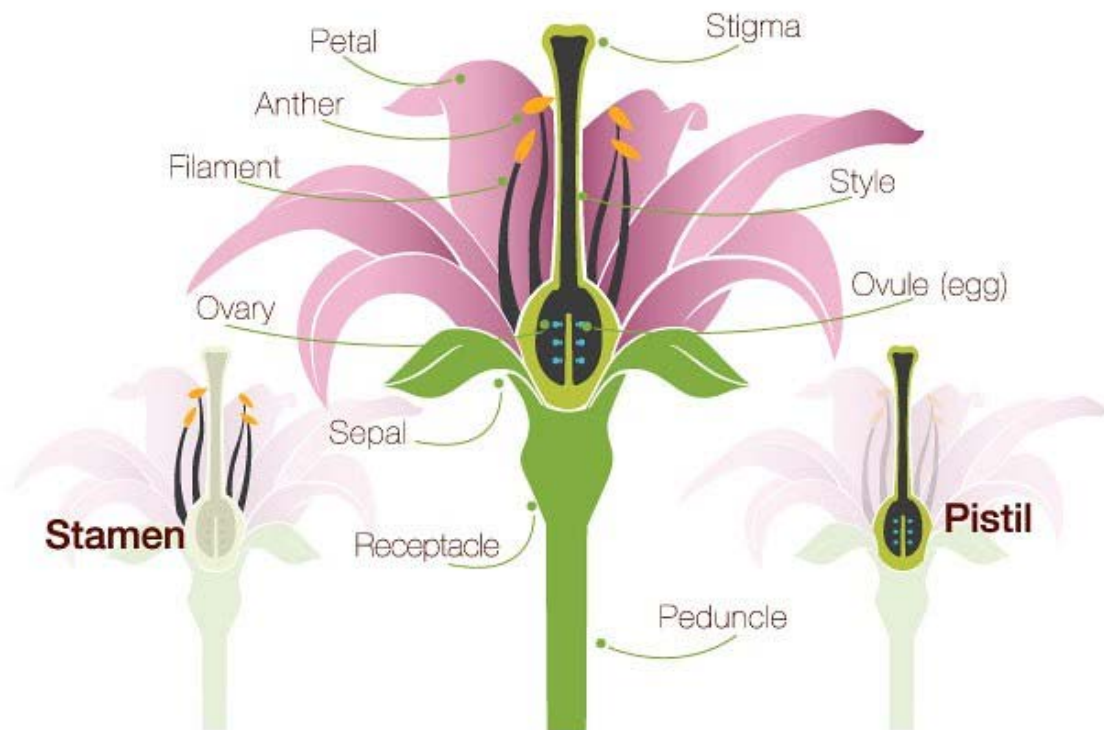
- **Anther** produces pollen (male gamete) that is typically yellow in color
- **Filament** holds up the anthers

Female parts: the **pistil** is a key indicator of a female part of a flower. It is composed of three parts:

- **Stigma** catches grains of pollen
- **Style** holds up the stigma
- **Ovule** (egg or female gametes)
- **Ovary** contains the ovules

Other parts that make up the structure of a flower:

- **Petals** are colorful parts of the flower that attract pollinators
- **Sepals** are specialized green petal-like leaves for protecting unopened buds
- **Receptacle** holds floral organs attached at the axis (stem) of the plant
- **Peduncle** or stem of the flower



# VIRTUAL SUMMER CAMP: STEM EXPLORERS

## 3- DIY Butterfly Feeder

*Educator Note: To understand the role of our pollinators, we are going to create a butterfly feeder and observe the different species we can attract. Please take notes and make observations about which insects/small animals your butterfly feeder will attract.*

### Simple Syrup (Sugar Water) Instructions:

**Safety Note: Adult supervision is needed to create your sugar water**

1. **With adult supervision**, combine equal parts water and sugar (9 tablespoons each) in a small saucepan and bring to a boil.
2. Allow to boil for 2 to 3 minutes until the sugar is completely dissolved.
3. Have an adult remove the pan from the heat and allow the syrup to cool completely.
4. While you wait for the syrup to cool, follow the instructions to prepare either a stationary butterfly feeder or a hanging butterfly feeder. (See below)

### Stationary Butterfly Feeder Instructions:

1. Clean your plastic cup or plastic jar and make sure there is no wrapping around the container.
2. Use tape or glue to attach the hand crafted butterflies you made earlier or artificial/silk butterflies to decorate the plastic cup or container.
3. Add the cooled simple syrup (or store bought simple syrup) one tablespoon at a time until the sponge or cotton balls are completely saturated. *(Make sure to reserve a small amount!)*
4. *Optional Step:* Add a few droplets of food coloring to help make the sponge or cotton balls more attractive to butterflies.
5. Add the saturated sponge/cotton balls to the bottom of the plastic cup or container.
6. Pour the reserved amount of simple syrup onto the orange slice.
7. Push the orange slice on the tip of the wooden skewer and place it in the plastic cup or container.
8. Fill your plastic cup or container with some artificial flowers.
9. Place the butterfly feeder outside: in a garden, on a flowerpot, outside your window or on a fire escape..
10. Change the orange slice every 3-4 days.
11. Observe what insects/animals your butterfly feeder is attracting!



# VIRTUAL SUMMER CAMP: STEM EXPLORERS

## Hanging Butterfly Feeder Instructions:

1. Clean your plastic cup and make sure there is no wrapping around the can.
2. **With adult supervision**, carefully use a scissor or holepuncher to create two small holes (directly across from one another) along the top edge of the plastic cup. If using a plastic container it is recommended to use a hole puncher instead. *(Be careful not to break your cup!)*



3. Cut two pieces of jute twine/yarn (or whichever material you want to hang your feeder with) to a length to 16-20 inches each.
4. Thread a piece of twine/yarn through one hole and tie both ends at the top. Repeat this for the other hole. This should make a loop that will allow the plastic cup or container to hang.
5. Use tape or glue to attach the hand crafted butterflies you made earlier or artificial/silk butterflies to decorate the plastic cup or container.
6. Add the cooled simple syrup (or store bought simple syrup) one tablespoon at a time until the sponge or cotton balls are completely saturated. *(Make sure to reserve a small amount!)*
7. Add the saturated sponge/cotton balls to the bottom of the plastic cup or container.
8. Pour the reserved amount of simple syrup onto the orange slice.
9. Push the orange slice on the tip of the wooden skewer and place it in the plastic cup or container.
10. Fill your plastic cup or container with some artificial flowers.
11. Hang the butterfly feeder in a garden, on a tree branch, on a flowerpot or outside your window. It will work best if placed about 6 six inches higher than flowers or 3 feet down from a tree branch.
12. Change the orange slice every 3-4 days.
13. Observe what insects/animals your butterfly feeder is attracting!

# VIRTUAL SUMMER CAMP: STEM EXPLORERS



## 4- Post-Experiment Wrap Up and Questions

Over the course of this experiment, we created a butterfly feeder and observed the different insects and small animals we were able to attract. Butterflies and other insects are important pollinators that assist in the life cycle of many plants. We hope this activity helped you learn about butterflies and the process of pollination and to continue protecting natural resources like the Hudson River!

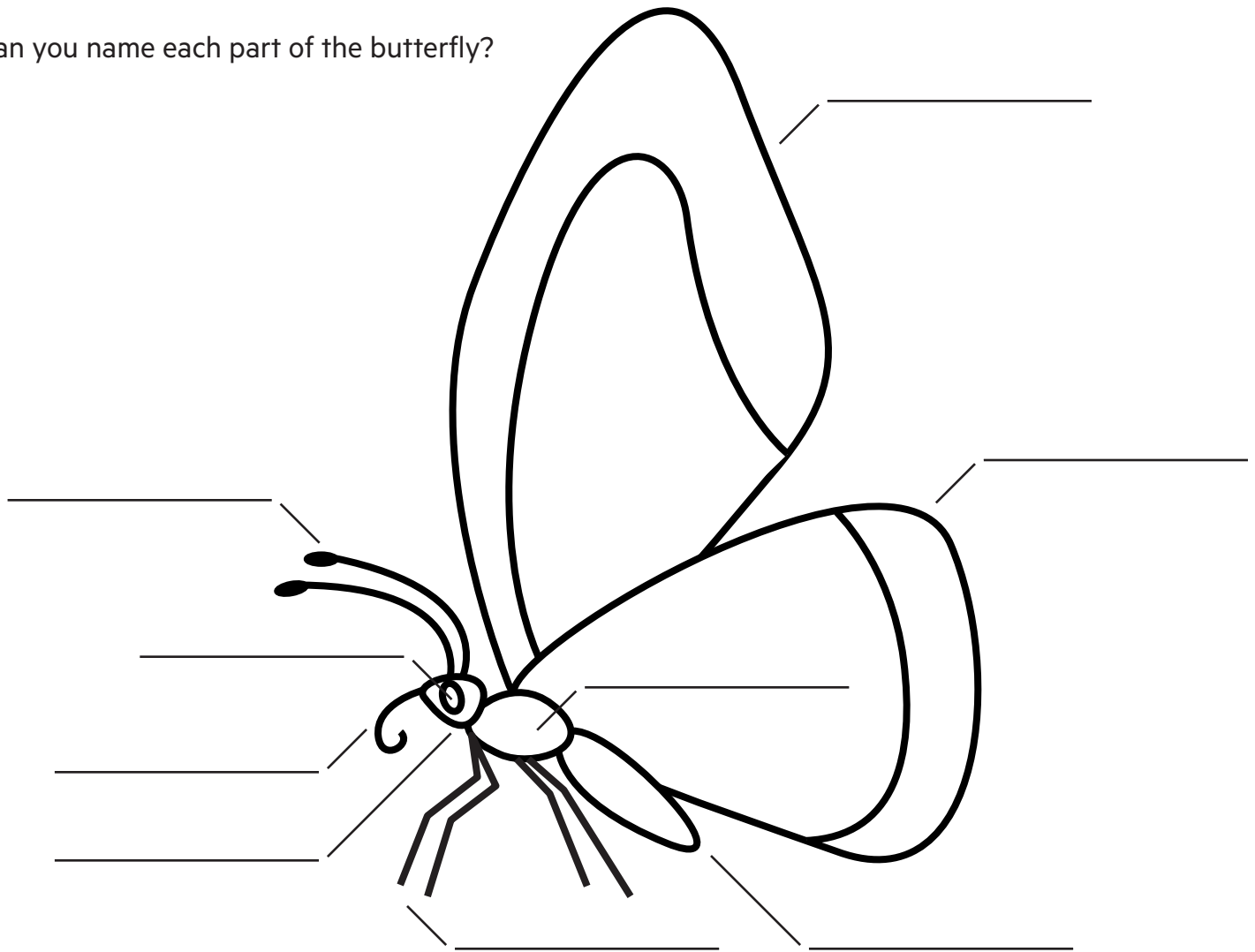
Now to wrap up and test how much you've learned, please use your observations to answer the following questions:

1. Why did we use an orange slice and simple syrup (sugar water)? (*What do butterflies eat AKA what is nectar?*)
2. Based on your observations of the butterfly feeder, what animals/insects did it attract? How many of each species did it attract?
3. Can you explain the importance of pollinators in nature?

# VIRTUAL SUMMER CAMP: STEM EXPLORERS

## BUTTERFLY ANATOMY

Can you name each part of the butterfly?



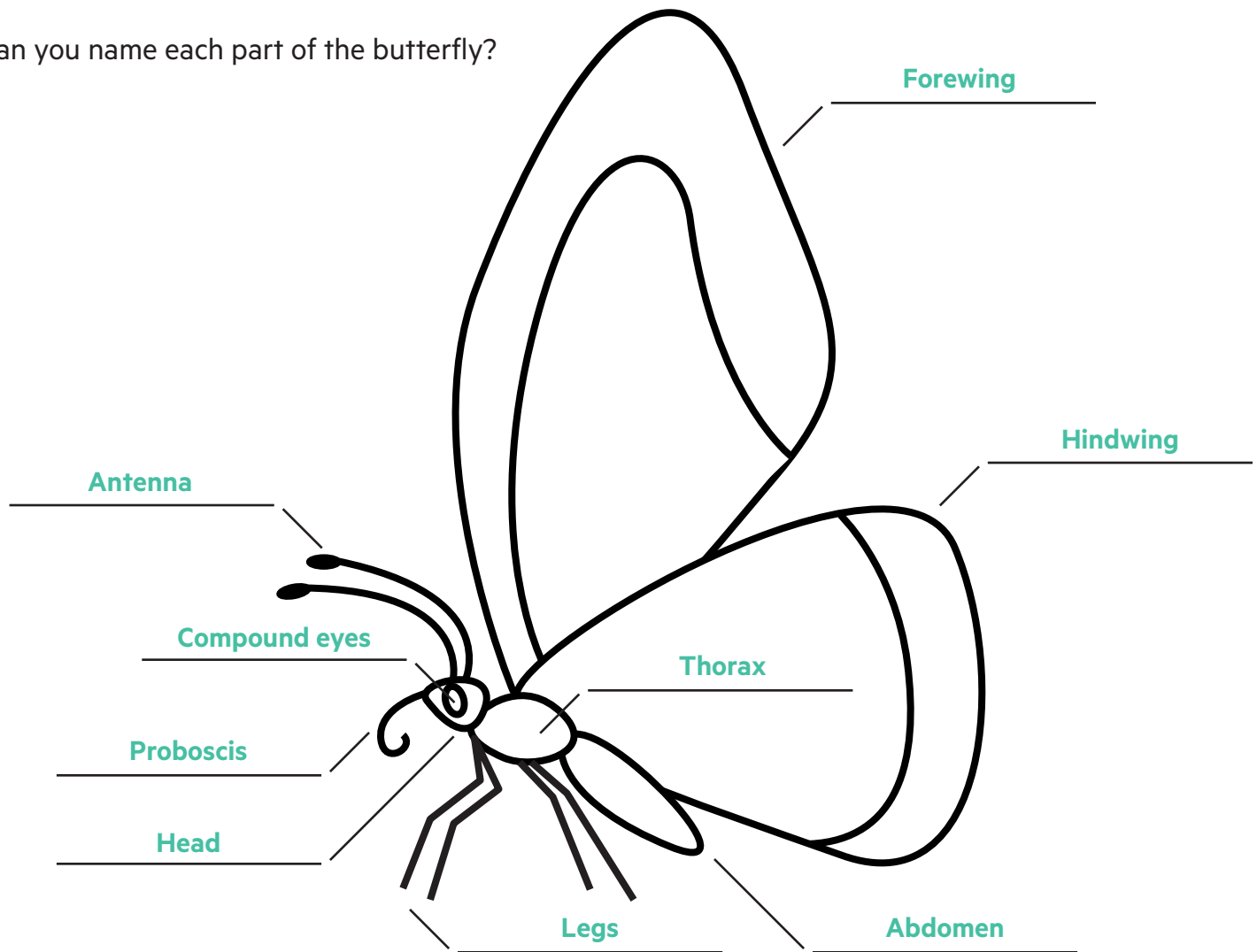
### Word Bank

Antenna	Legs
Thorax	Head
Forewing	Abdomen
Proboscis	Hindwing
Compound eyes	

# VIRTUAL SUMMER CAMP: STEM EXPLORERS

## BUTTERFLY ANATOMY

Can you name each part of the butterfly?



# VIRTUAL SUMMER CAMP: STEM EXPLORERS



Egg

## The Life Cycle of a Monarch Butterfly

HUDSON RIVER PK



Butterfly



Caterpillar



Chrysalis