

STEAM Butterfly Symmetry Investigation

All About Butterflies

Have you ever looked at a butterfly in awe? As summer comes along, more and more butterflies emerge from their cocoons to show off their beautiful wings. Butterflies have inspired art and science alike for many years. Their life cycles embody magnificent metamorphosis, making them exciting creatures to examine. With this fun STEAM project, students will learn about the stages of the butterfly life cycle, the main elements of butterfly anatomy and the unique functions of butterfly wings before creating their very own stained glass butterfly craft!

Ask your students:

1. What do you know about butterflies?
2. What colors of butterflies have you seen?
3. How big are the butterflies you've seen?



HANDS-ON STEM EDUCATION

For over 30 years, PCS Edventures has inspired students to develop a passion for Science, Technology, Engineering and Mathematics (STEM), focusing our efforts on making learning and discovery a fun and interactive process for grades K-12.

- Classroom
- After-School
- Home Learning

Butterfly Background Information

LIFE CYCLE



Butterflies have 4 phases of life: *egg*, *larva*, *pupa* and *adult*. How long it takes for a butterfly to go through the cycle depends on its species. Some may take as little as one month while others take up to an entire year.

Phase 1: Egg

Butterfly eggs are usually laid on a leaf. They have different shapes and sizes, depending on the kind of butterfly.

Phase 2: Larva

The larva, or caterpillar stage, happens when the butterfly emerges from the egg. Because caterpillars are small and weak when they hatch, the mother butterfly must be careful to lay her eggs on a type of leaf that the caterpillar can eat. As soon as the caterpillar comes out from the egg, it will eat and eat and eat so that it can grow.

Phase 3: Pupa

Once the caterpillar has eaten and grown to its full size, it will spin itself into a cocoon, otherwise known as a chrysalis or pupa. From outside, the chrysalis looks to be very still and unmoving, but inside, the caterpillar goes through rapid and significant changes. It must grow limbs, body parts and wings to become a beautiful adult butterfly.

Phase 4: Adult

After all the necessary changes have taken place, the adult butterfly will emerge from its chrysalis. Even though it has never flown before, a butterfly will be a master flyer with just 3-4 hours of practice.

The life cycle of a butterfly ends when the female adult lays her own eggs.

ANATOMY

Butterflies are flying insects whose sizes are measured by the distance between the tips of their wings, called a **wingspan**. The smallest butterflies have wingspans smaller than an inch, while the largest butterflies can average around 10 inches. They all have six legs, three main body parts, one pair of antennae and two pairs of wings.

The main body parts of a butterfly include the head, thorax and abdomen. The **thorax** is another name for the chest of the butterfly. The two pairs of wings and six legs of the butterfly are attached to the thorax, where the muscles involved in movement are located. Above the thorax is the **head**, where antennae are attached. They help the butterfly smell and sense directions. The **abdomen** is the tail end of the butterfly's body.

The **wings** of a butterfly are covered in vibrant, colorful scales. Despite the fact that most people think butterflies have one pair of wings, they actually have two pairs, or four wings in total! Delicate veins run throughout the wings so that the butterfly can pump blood into them and fly.

Go to page 7, 8 and 9 to print student activity pages.



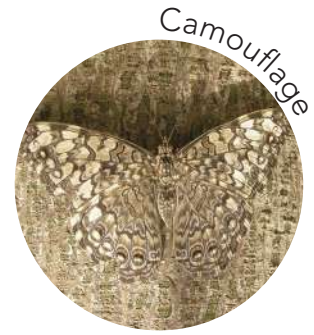
WING PATTERNS

Butterfly wings are large, colorful and beautiful. They have different patterns and markings, depending on the species. Wings play an important role in a butterfly's life as they enable flight, allow better mate selection, and provide protection. Butterflies fly by beating and fluttering their big wings.

The pretty colors and patterns of the wings not only help attract other potential mates but also give butterflies essential protection. There are three big survival techniques wings provide. The first technique is camouflage. **Camouflage** is when animals or insects avoid predators by blending in with their surroundings. Butterflies use their wing patterns to disguise themselves as various leafy plants and tree bark.

Another way butterflies use their wings to stay safe is through **aposematic coloration**, also known as **warning coloration**. In nature, bold and vibrant colors are often used by plants or insects to communicate danger. As such, butterflies often use very vibrant wing colors, such as bright orange or red, to warn predators that they might be poisonous, and therefore dangerous.

The last way butterfly wings help them survive is through **mimicry**. This means that the wings of the butterfly are made to look like something else for protection. For example, eyespot mimicry is when the wings have large circles on them to resemble the eyes of a bigger animal. This can confuse or scare predators, keeping butterflies safe. In addition, some butterflies that aren't poisonous copy the wing patterns of a poisonous butterfly to try to keep predators away.



LET'S REVIEW:

1. What are the four stages of a butterfly's life? **Egg, Larva, Pupa, Adult**
2. List three of the main parts of a butterfly's anatomy. **Wings, Head, Thorax, Abdomen, Antennae, Legs**
3. What are three ways a butterfly's wings might keep it safe? **Camouflage, Aposematic Coloration (Warning Coloration), Mimicry**



Stained Glass Butterfly Model

MATERIALS:

- Construction Paper (preferably dark, but any color works)
- Tissue Paper
- Glue
- Scissors
- Waxed or Parchment Paper
- Pencil
- Butterfly Template (provided on page 8)



INSTRUCTIONS:

1. Print out the provided butterfly template.
2. Cut out the butterfly template so that you are left with only the black outline of half the butterfly.
3. Cut a few sheets of tissue paper into 1-inch squares or the shapes of your choice.
4. Fold one sheet of construction paper in half crosswise (hamburger style).
5. Align the center of the butterfly with the shorter, folded edge of the construction paper.



6. Trace the inner and outer outline of the butterfly template onto the paper with a pencil and cut along the lines.
7. Cut out a piece of wax paper big enough to cover your entire butterfly template.
8. Open up your folded construction paper template so the butterfly is fully symmetrical and trace the outer outline onto the wax paper.
9. Put glue inside the traced outline of your butterfly on the wax paper.
10. Begin sticking the tissue paper pieces onto the wax paper as you like, adding glue as needed.
11. Flip the wax paper over to the smooth side and cut along the visible pencil lines into a butterfly shape.
12. Lay the construction paper outline on top of the tissue-papered sheet wax paper side you like, trim as desired, then glue.
13. Tape your new stained glass butterfly to a window or hang in front of a source of light and enjoy!

TIP: With the leftover tissue paper and construction paper butterfly outline, you can make a stained glass butterfly card!



Label a Butterfly's Anatomy

abdomen antenna head thorax wing



Symmetry Practice

Draw in the missing butterfly halves to practice creating symmetrical wings.



Printable Butterfly Template



References:

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