

Whether your students are doing a science fair project, a classroom science activity, independent research, or any other hands-on science activity, understanding the steps of the scientific method is important. The Scientific Method has five parts:

ASK A QUESTION RESEARCH THE ANSWER CONSTRUCT A HYPOTHESIS

DO AN EXPERIMENT ASK (DID IT WORK?) & REPEAT...

In the Rhinoceros Beetle model project, your students will need to think about a question they would be interested in exploring. Doing a model building project could be an “experiment” for them as they use various techniques in the creative process.

Rhinoceros Beetle Model Project



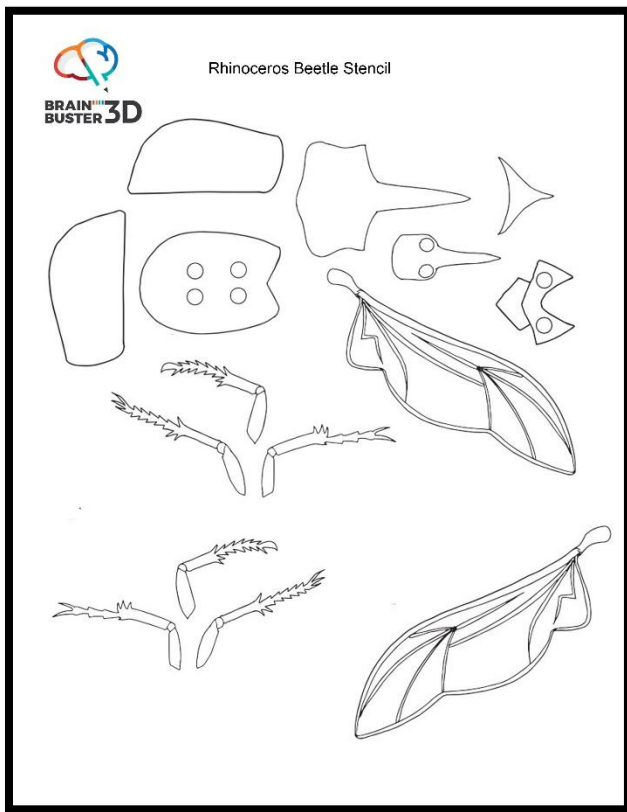
STEAM: Science

Building a Rhinoceros Beetle model will help your students learn Science. How?

- They will use a stencil to create each part of the insect.
- They will need to arrange the parts of the insect as they would a puzzle, and determine which parts need to be welded together to create the 3D form of the insect.
- They will use a technique of melting the plastic to add contour to the shape. They will need to use caution when working with hot plastic to shape and form it.

Materials Needed: Rhinoceros Beetle Stencil (page 7), 3D Pen, 2-3 colors of PLA filament, scissors, silicon thumb & finger protectors, a paper towel or napkin.

Optional: To keep the stencil intact, place it in a plastic sheet protector.



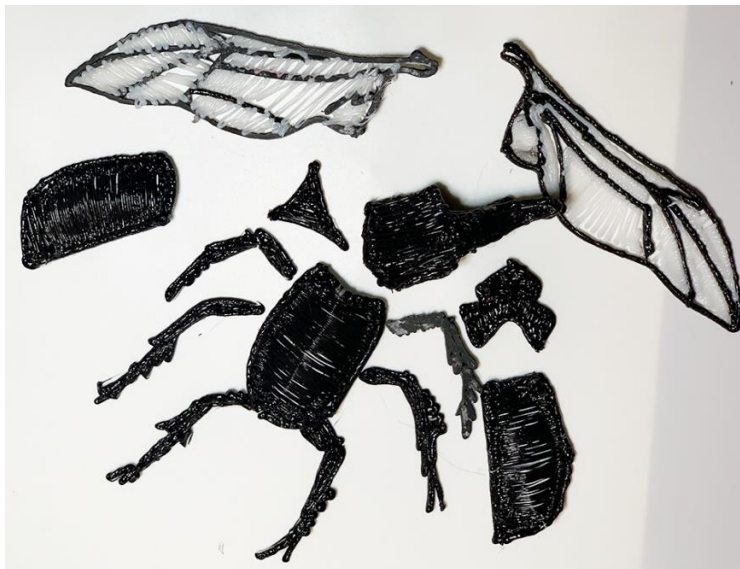
STEP ONE:



Make a copy of the Rhinoceros Beetle Stencil. If you need directions about how to operate a 3D pen, please refer to the **Teacher 3D Pen Operator Guide**. Once the 3D pen is heated and loaded with filament, direct your students to find a starting point on the stencil to anchor the filament. They will need to move the 3D pen along the lines to outline each part. Once all the parts are outlined, they will fill in each part by moving the 3D pen back and forth between the outline they made.

They can select any color of filament to create their beetle model. If they do not like the PLA filament colors' that they have, they can paint the parts with acrylic paint before they remove them from the stencil or paint their finished beetle model.

STEP TWO:



If your students used a plastic sheet protector, the parts should peel off the stencil easily. If they made the parts by extruding the filament directly on the paper stencil, some of the paper will stick to the back of the parts they made. To remove the paper, rinse the plastic parts with warm water and dry them with a paper towel.

Students need to arrange the parts as they would a puzzle to see which ones will need to be welded together to form the 3D Rhinoceros Beetle model.



Students need to select the two parts to make the head of the beetle. They will need to use they 3D pen to melt the plastic in the middle of the larger piece and shape it into a "v". They will use the tip of the pen to melt the horn area and bend it upwards slightly.

Next, they will take the smaller triangular part and melt it down the middle to shape it into a “v”. They will weld it under the larger horned shaped head to form a jaw.

Your students should be reminded to use caution when they use the pen to heat the plastic and shape the plastic with their fingers. It will stay pliable as it cools so they can easily shape it without the plastic being excessively hot to touch.

STEP THREE:



Again, they will use the 3D pen to heat plastic down the middle of the shell to bend it in a “v” shape as they see pictured above.

STEP FOUR:



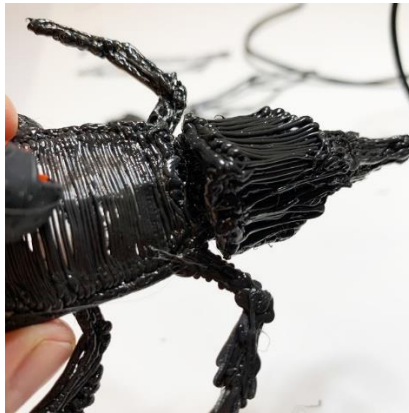
Your students will need to arrange the legs around the shell. They will weld the legs to the underside of the shell that will make up the body.



STEP FIVE:



To attach the head, students will need to find the part shaped as pictured above. They will weld the part to the underside of the top of the shell. Following that, they will weld the head to the attached part.



They should see a gap between the head and the shell when they turn it over right side up as pictured above.

STEP SIX:



There are two sets of wings. They will attach and weld the large white wings to the body of the beetle first, then they will weld the second set of black wings to the top of the large white wings.



The Rhinoceros Beetle is now complete!

Encourage your students to learn the names of the parts of the beetle
and to find other interesting insects to build.

Have your child test the Rhinoceros Beetle by placing it in interesting places.

Observe to see if people think the model is the real thing!

Rhinoceros Beetle Stencil

