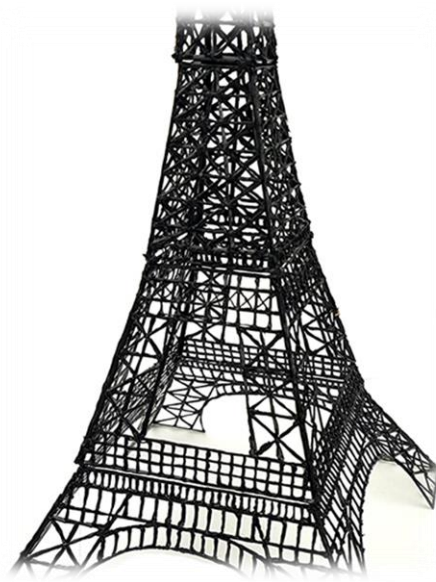


Engineering skills involve asking questions, imagining possibilities, and thinking creatively to solve problems. The engineering design process is a series of steps engineers use as they work to solve problems. There are five main steps:

ASK IMAGINE PLAN CREATE IMPROVE

In the Eiffel Tower model project, students will be provided the “PLAN” for making a model tower. Their job will be to **CREATE** the model. Once they finish the model it is important that they think about ways they could **IMPROVE** the process or the design. This could mean that they would design a better **PLAN** and **IMAGINE** their own design for a newly designed tower.

Eiffel Tower Model Project



STEAM: Engineering

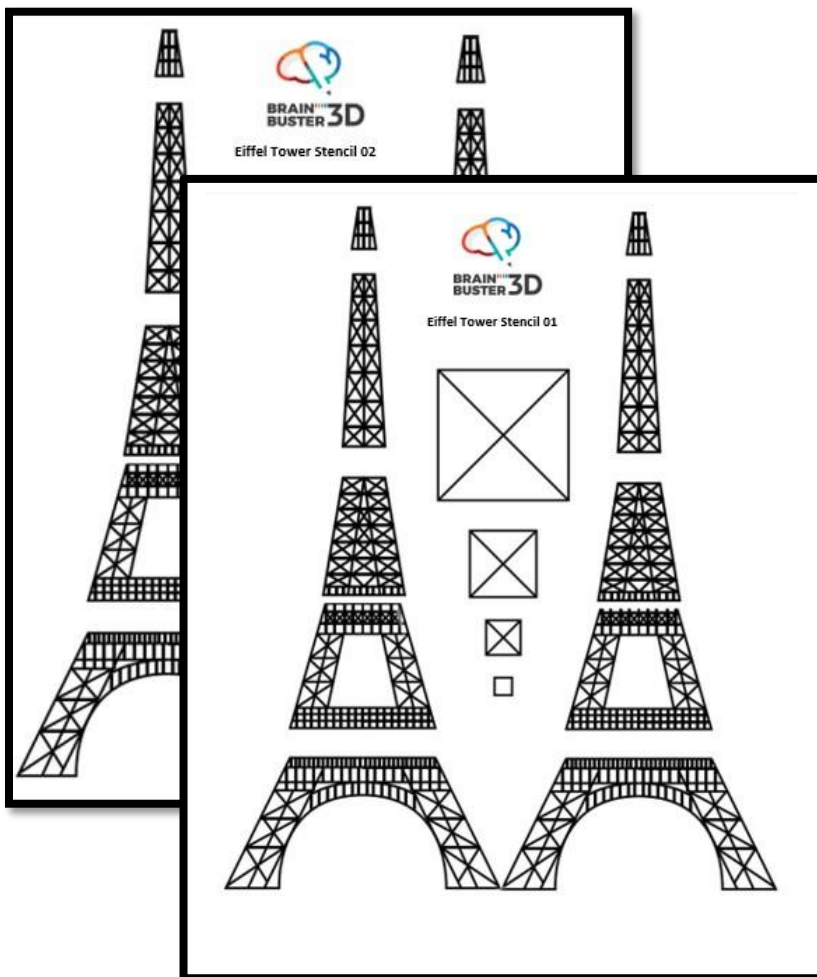
The engineering design process is a series of steps engineers use as they work to solve problems. There are five main engineering steps: **ASK IMAGINE PLAN CREATE IMPROVE**

Building an Eiffel Tower Model will help students learn Engineering Skills. How?

- They will use a stencil which is their **PLAN** to create each part of the tower.
- They will need to arrange the parts of the airplane as they would a puzzle, and determine which parts need to be welded together to **CREATE** the 3D form of the tower.
- When they finish the model, direct students to think about ways they could **IMPROVE** the process or design.
- **ASK** students to **IMAGINE** how they would **PLAN** and **CREATE** their own design for a 3D building or tower model.

Materials Needed: Eiffel Tower Stencils 01 & 02, 3D Pen, 1 color of PLA filament, scissors
silicon thumb & finger protectors, a paper towel or napkin.

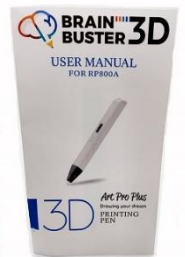
Optional: To keep the stencil intact, place it in a plastic sheet protector.



BRAIN BUSTER 3D Art Pro Plus Kit Contents



AC/DC Adapter & USB



Thumb & Finger
Protectors



3 Pack of PLA Filament

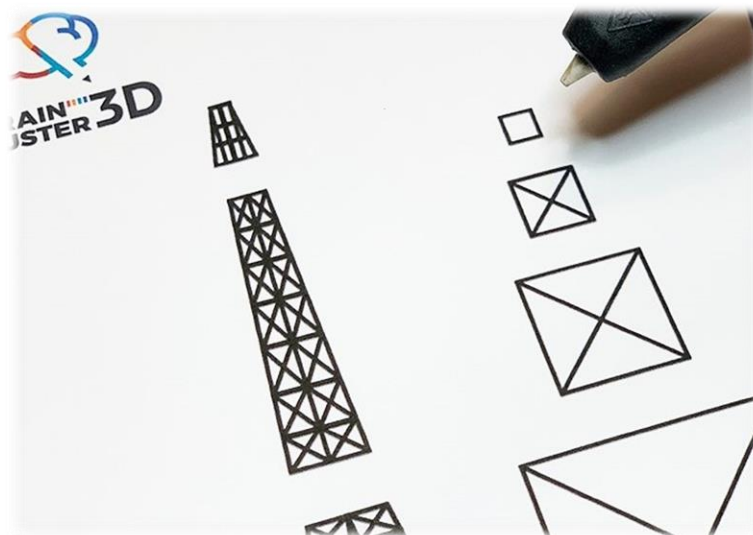


Plastic Tool



STEP by STEP INSTRUCTIONS

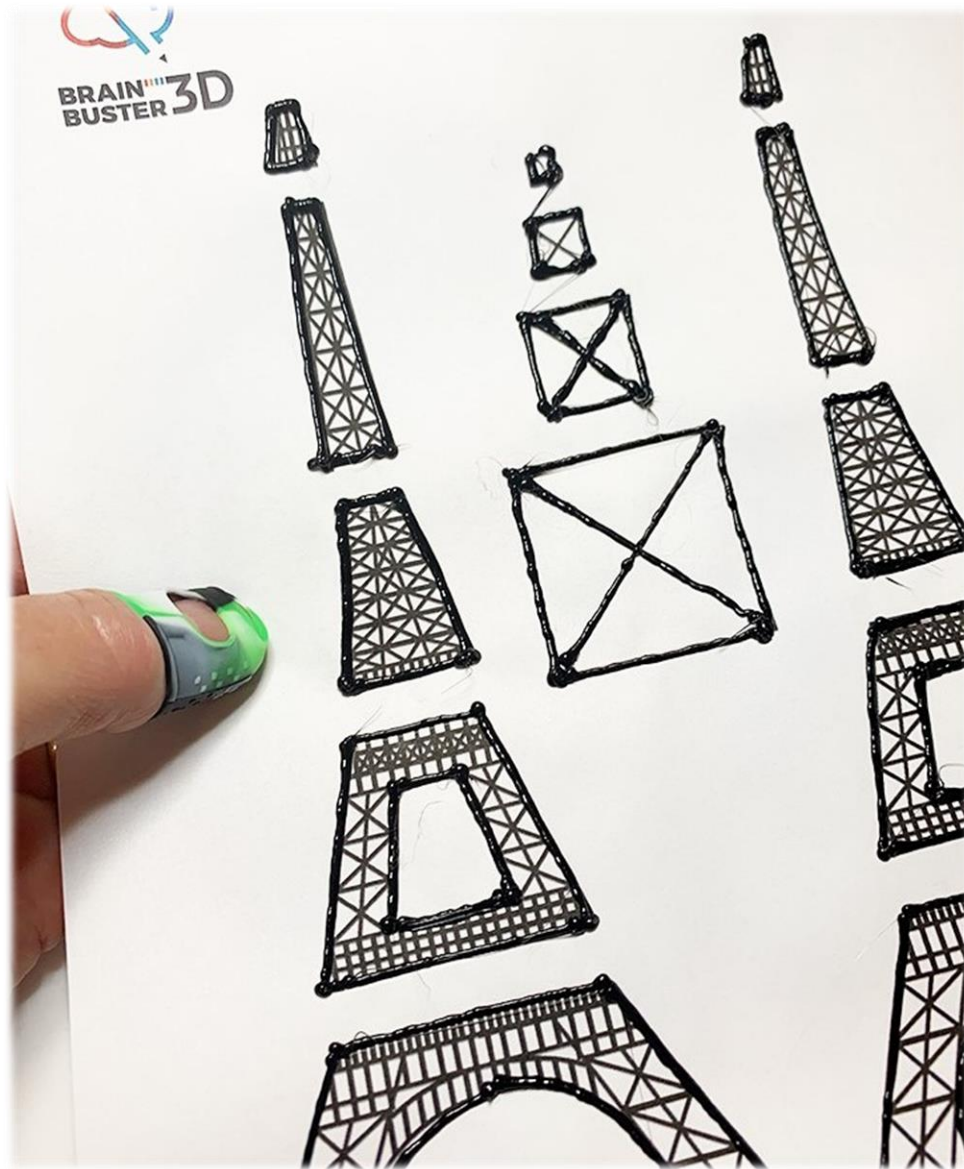
STEP ONE:



Make a copy of the Eiffel Tower Stencils 01 and 02. 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 students find a starting point on the stencil to anchor the filament. They will then 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 Eiffel Tower 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 tower model.

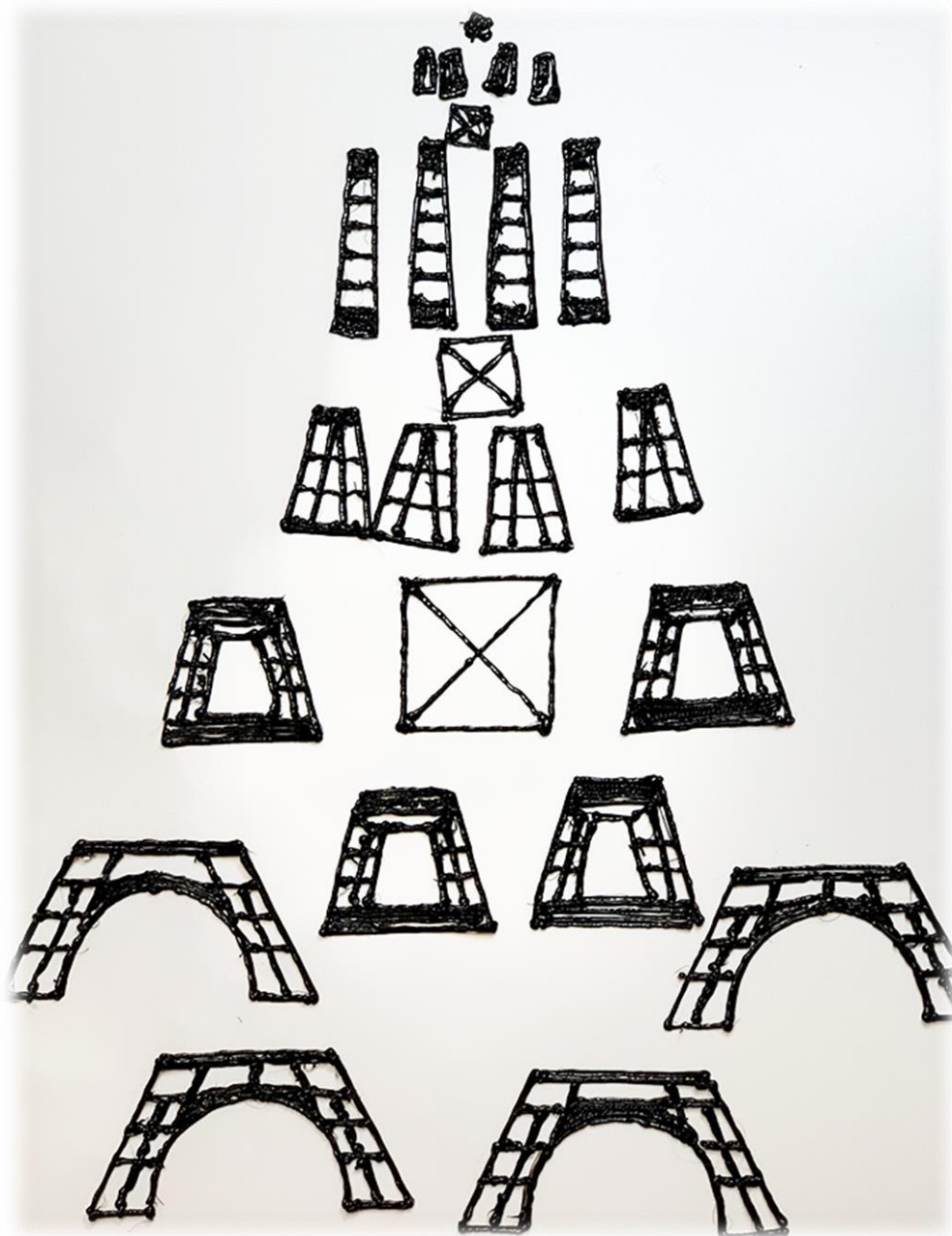
STEP TWO:



If 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.

STEP THREE:



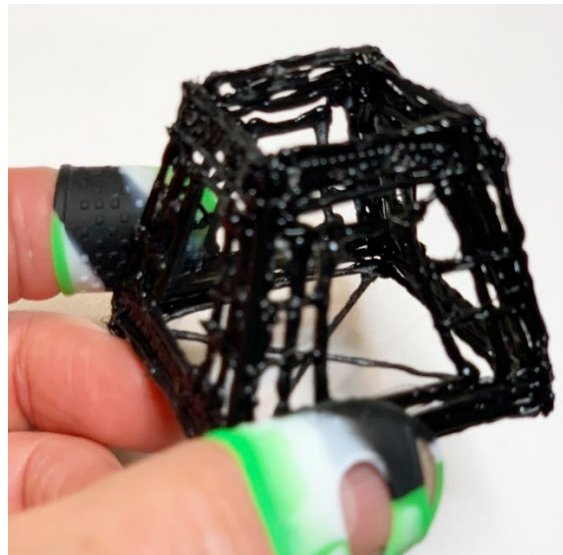
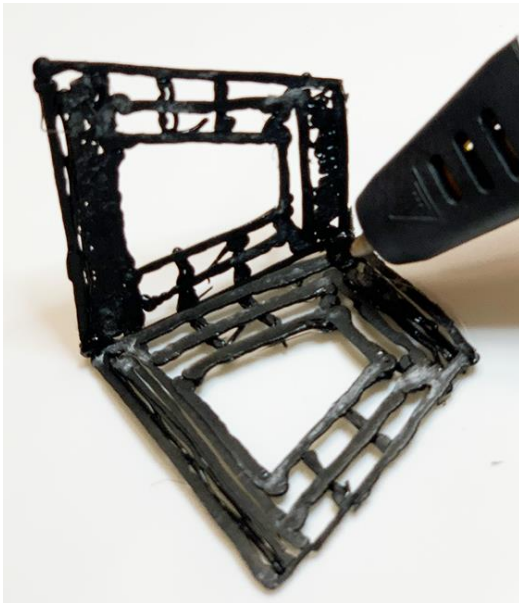
Arrange the parts as they would a puzzle to see which ones will need to be welded together to form the 3D Eiffel Tower model.

STEP FOUR:



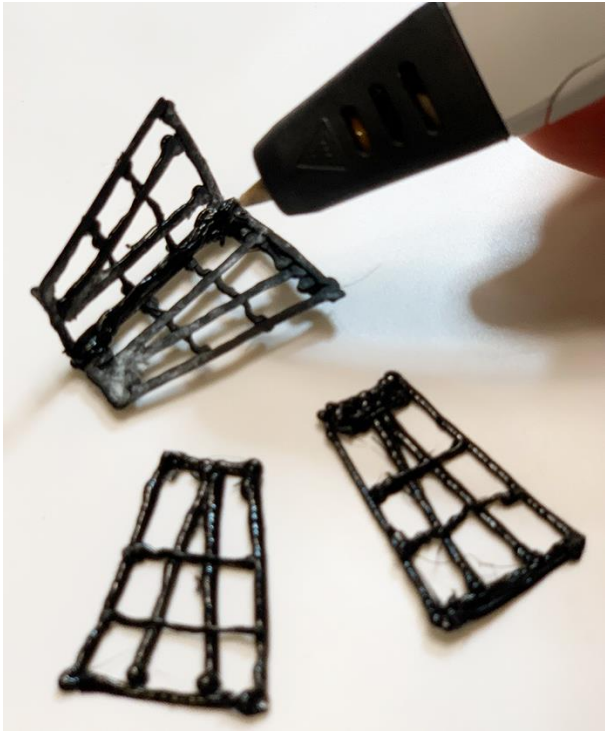
Have students gather the four largest parts for the base of the tower. Next, they will weld two parts edge to edge, welding them together from the inside at 90 degree angles as pictured above.

STEP FIVE:



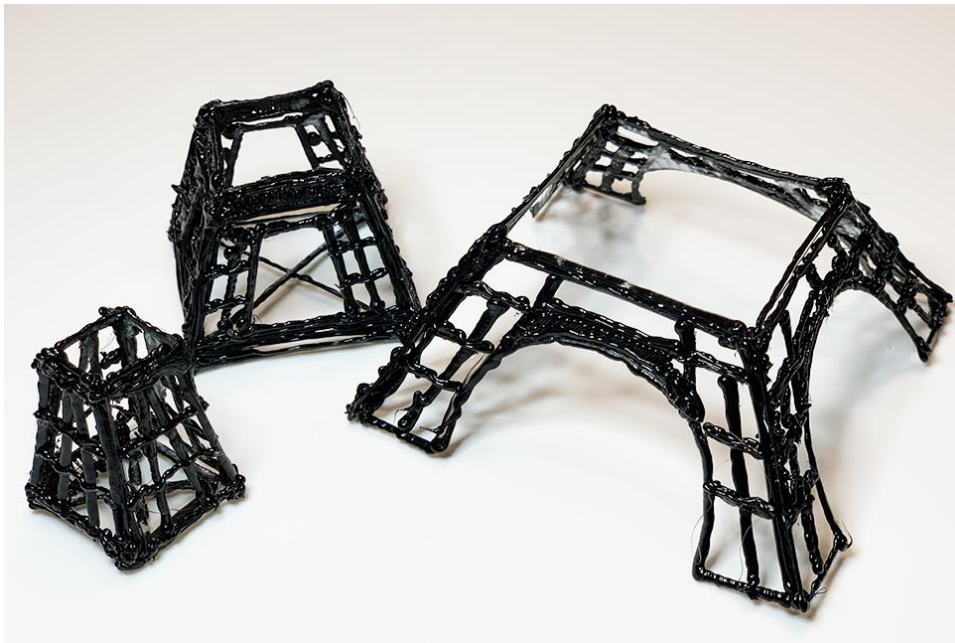
Have students gather the parts for the second level of the tower. They will repeat the same process and technique as they used to build the tower base.

STEP SIX:



Have students gather the parts for the third level of the tower. They will repeat the same process and technique as they used to build the tower base.

STEP SEVEN:



Students will stack the two levels of the tower on the base and will weld them securely in place.

STEP EIGHT:



Lastly, students will build the top section of the tower and will weld it in place at the top.



When they finish the model, direct students to think about ways they could IMPROVE the process or design.

ASK students to IMAGINE how they would PLAN and CREATE their own design for a 3D tower model.

For instructions on shutting down the 3D pen how to store it for future projects, refer to the ***Teacher 3D Pen Operators Guide***.

The Eiffel Tower



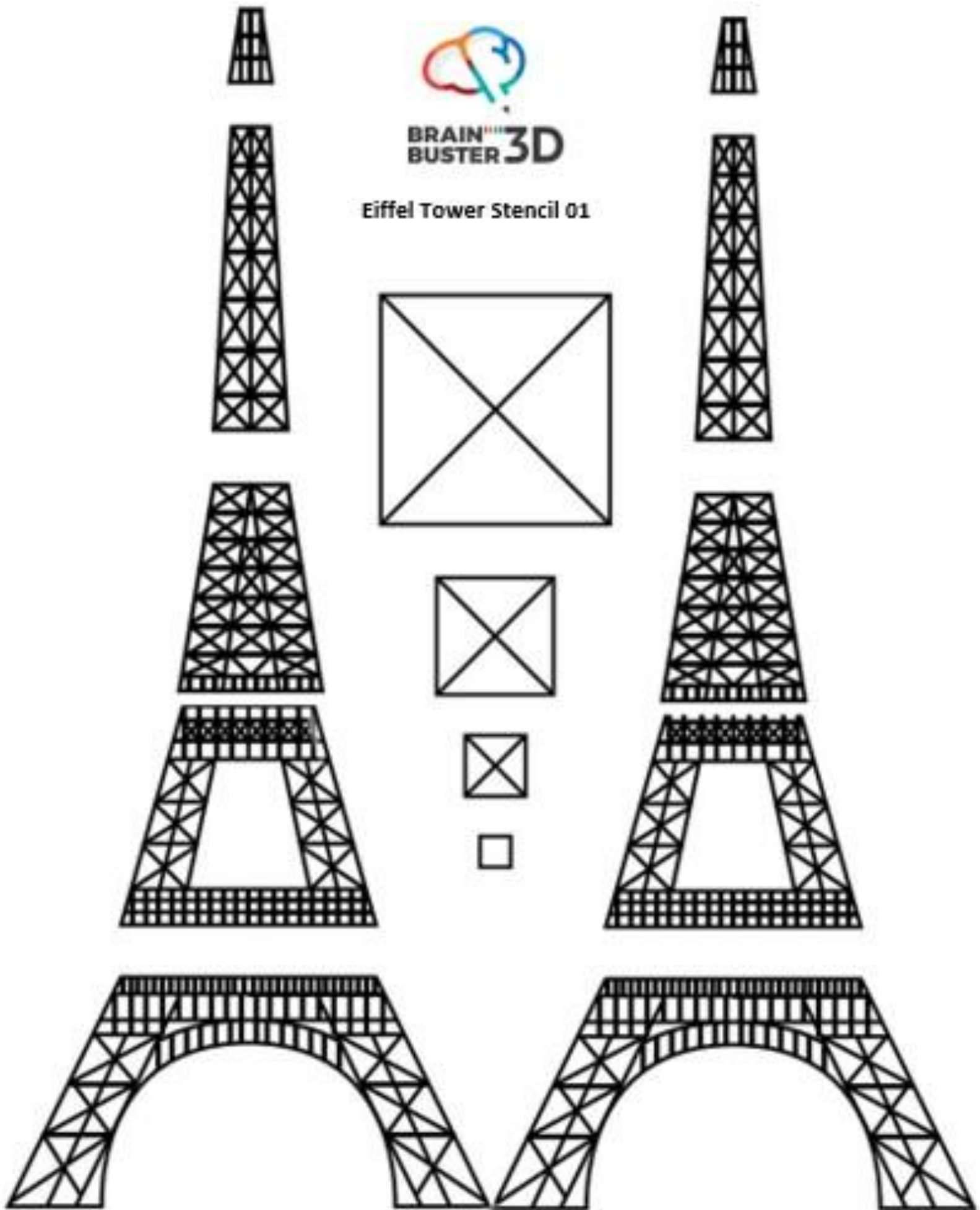
3 Interesting facts:

- The Eiffel tower is 986 feet tall and is constructed out of iron material.
- The Eiffel Tower was built in 1889 and was the tallest structure in the world until 1930.
- The tower was named after its designer and engineer, Gustave Eiffel, and over 5.5 million people visit the tower every year.



**BRAIN^{3D}
BUSTER**

Eiffel Tower Stencil 01





BRAIN BUSTER 3D

Eiffel Tower Stencil 02

