

Make a Chair by Paper

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Motive · Purpose · Precedent Study

We tried to find out if paper could hold a person up.

We examined the strength of a sheet of paper of the size of B5.

We examined the change of strength as we change the number of column, the position of a column and the amount of paper per a column.

About the strength...

The strength mean vertical load that paper can support.

Previous Study

We examined the strength of each of the following structures respectively: an equilateral triangular prism, an equilateral quadrangular prism, an equilateral pentagonal prism, an equilateral hexagonal prism and column twice. As a result we realize a column is the strongest.

Yamada Shino(power of paper)

Preliminary experiment

《Purpose》

We research the strength of a column.

《Method》

- ① We made columns which have 1.0cm overlap width.
- ② We set up columns like Figure1 and hung weights at vertical.
- ③ We examined that the column which go like figure2.

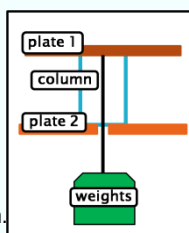


Figure 1

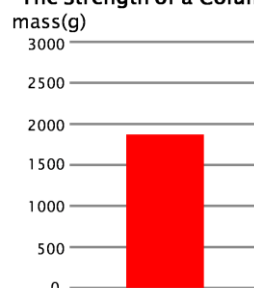


Figure 2

《Result》

We found a column has enough strength to hold the weight of 1900g.

The Strength of a Column



we decided this strength is "criteria".

Experiment 1

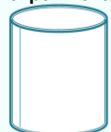
《Purpose》

We prepared four columns that use at the Preliminary experiment and examined the change of strength per a column.

《Hypothesis》

The strength per a column is still same. In other words the overall strength goes high overall in proportion to the number of column.

Preliminary experiment

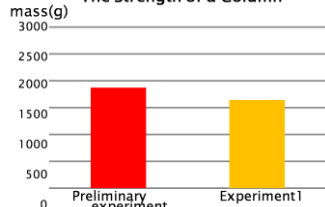


Experiment 1



《Result》

The Strength of a Column



When the number of columns increased, the strength per one goes low.

《Consideration》

Our Hypothesis is different from the Result because the plate 1 is not firmly connected with the column because of various sizes of each column.

Experiment 2

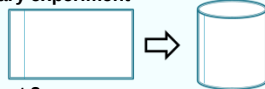
《Purpose》

We examined the strength per one paper after we set four columns next to each other.

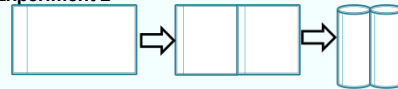
《Hypothesis》

If we make column with a shorter circumference, it goes high because the load is spread.

Preliminary experiment

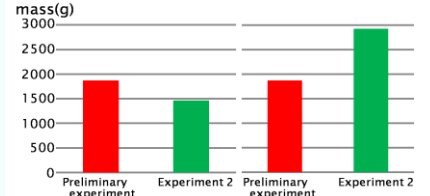


Experiment 2



《Result》

The Strength of a Column The Strength per one Column



The strength per a column is stronger in the Preliminary experiment than Experiment 2.

However, the strength per a paper is stronger in the experiment than the Preliminary experiment.

《Consideration》

Load was spread and the strength was high, so Hypothesis matched with Result.

Experiment 3

《Purpose》

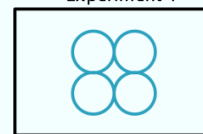
We examined the strength per a column that we used in the Experiment 1 when we change the position of columns.

《Hypothesis》

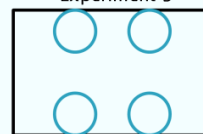
The strength per one column is still same even if the position of the column is changed.

Bird's-eye view

Experiment 1

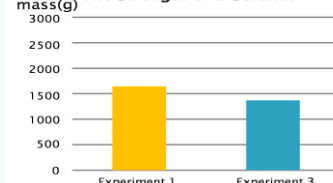


Experiment 3



《Result》

The Strength of a Column



As a result of Experiment 3, we found the strength go high when columns next to each other.

《Consideration》

The reason for Hypothesis and Result are different by connecting columns each other, it is hard to transform columns.

まとめ

According to Experiment 1, Experiment 2 and Experiment 3, we discover the strongest column can hold the load of about 3000g.

Supposing human weigh seventy kilograms, we expected paper can hold a person up, by setting columns next to each other. Then size of chair is 28cm×28cm, so people can sit down it.

These experiments examined only vertical load. So we need to examine other power.