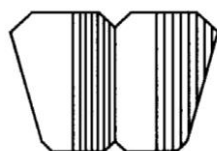


SCIENCE II
Annual Report on Research Activities
Abstracts in English



2018

Kyoto Prefectural Rakuhoku High School

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Mechanism of Habit Modification by Urea on Crystallization of NaCl

Shota Sasada

Abstract

Habit modifiers are known as substances which can change the form of a crystal. In this study, I used urea as a habit modifier. I deformed NaCl crystals by evaporating aqueous NaCl under different concentrations of the habit modifier and investigated the relationship between the concentration of urea and the size and form of the NaCl crystal. As a result, the more urea there was, the more octahedral crystals were formed. In addition, hexahedral NaCl crystals became smaller as the concentration of urea decreased while the size of the octahedral crystals didn't change. This result shows that the habit modifier hinders the growth of the other crystal faces and creates new faces. More urea was found on the $\{100\}$ than on the $\{111\}$. And the size of urea and that of Cl^- are alike. Therefore, urea is adsorbed on the $\{100\}$ and interrupts the adsorption of Cl^- . Octahedrons cannot be piled without clearance, so I suggest that this octahedral NaCl crystal can be used to make salt difficult to congeal.

Difference in Tone Depending on Slide Bar

Issei Doki

Abstract

“Slide guitar” is a guitar technique which changes a guitar tone by using a slide bar. The material of a slide bar makes a difference in tone. This paper aims to reveal how tone is changed and how slide bars make tone differences. In the experiment I played the guitar with an acrylic slide bar, a glass slide bar or my own finger, and compared their frequency characteristics and envelopes. The results reveal that their frequency characteristics and envelopes differ depending on the slide bar and its material, and that playing with a finger causes a smaller damping than playing with a slide bar.

Synthesis between the Gels, and Its Possibility as a Cushioning Material

Yuto Kawaguchi, Atsuhito Kataoka, Sota Kamon, Yuji Yoshii

Abstract

Gels is a substance which loses liquidity and becomes solid by crosslinking the colloidal particles. In the case of polymers in particularly, they have flexibility because of captured water inside. According to previous research, it is obvious that DN gels which have two types of crosslinking are capable of combining. In our study, then, we thought that DN gels are better than SN gels which have a type of cross linking in terms of synthesis conditions and impact absorption, and we tried an experiment to verify. When we put weights on the SN gel and the DN gel, the SN gel was broken down completely at 2.5kg. In contrast, the DN gel maintained a 1.5-centimeter height until the weight reached 5kg and was broken down at 8kg. Also, when we removed the weights which were on the DN gel, it was restored to 2.6-centimeters tall. As a result, it can be said that DN gel has an advantage in terms of resisting more pressure than SN gel. Also, it can expected that we will be able to use DN gels as a cushioning material which absorbs the impact of being caught between things, or of falling objects.

Keywords: DN gel, cushioning material, SN gel, crosslinking, resisting pressure

Creating Safe Soap Which a Baby Can Eat

Akira Okinami, Shunya Kai, Akira Tsukamoto, Daikei Matsuyama

Abstract

Generally, the soap that is on the market is basic, but if you consume it, your body will be adversely affected. Therefore, we tried to make a safe soap that babies can eat even by accident. As a first step towards making such a safe soap, we attempted to make a neutral soap. To this end, we carried out a series of experiments. In experiment 1, soap bubble emerged, but it was not bubbling. The pH was valued at 9.7. In experiment 2, soap bubble did not emerge, and it was not bubbling. It smelled like alcohol. We should improve the experiments in two respects to create a neutral soap. First, we need accurate gauging of materials used in the experiment. Second, more time to heat them is necessary for us because the yield is enhanced.

Key words: Neutral salt soap, pH

Let's make our skin white with tomatoes!!

~Inhibiting Melanin with Lycopene~

Minori Sumioka, Rena Fukushima, Sana Kaneda, Yuri Taniwaki

Abstract

Based on our hypothesis that lycopene inhibits the generation of melanin, we conducted experiments with tomatoes, which contain lycopene. Since the function of a sunburn is similar to that of the browning of potatoes, we made use of it to see if lycopene has the effect on this mechanism. We extracted lycopene by acetone and added the solution composed of tyrosine and strained potatoes. We kept it in an incubator at a certain temperature for a long time, and watched the degree of browning. Our results showed that our hypothesis could be correct, as lycopene-containing samples showed less browning. Judging from our results, we concluded that lycopene inhibited the creation of melanin. We also concluded that the higher the concentration of lycopene the tomatoes contain, the more it could inhibit melanin.

Keywords: tomatoes, lycopene, tyrosine, potatoes

The Release of Nanoparticles from Artificial Salmon Roes ~The Change by Means of Electrification~

Miki Ise, Haruka Nasu, Ayaka Noda, Natsuki Taguro

Abstract

This is basic research of a drug delivery system which is to send a medicinal ingredient to an organ of the body precisely. We regarded nanoparticles as components of medicine and put them into an artificial salmon roe capsule. We tried to control the amount of nanoparticle released from the artificial capsule depending on charge, plus, minus, no charge. We want to apply this experiment to control the amount of ingredient of medicine from the capsule into a human body. As a result, the amount of released nanoparticles from artificial salmon roes, in decreasing order are; plus, minus, and no charge. However, we couldn't get enough data to prove or disprove our hypothesis, also we had some errors in our experiment, so there is room for improvement.

Keywords: drug delivery system, artificial salmon roes, nanoparticles, charge

Protecting Us from Sunburn with Polyphenol: Which has the strongest effect on UV?

Ruina Ito, Amane Kishimoto, Riko Suzuki, Juli Ji

Abstract

With the number of ultraviolet rays which reach the ground increasing in recent years, concern about its effect on humans has also been growing. Because of that, we thought we would be able reduce the damage to both the inside and outside of our bodies if we took advantage of plant-derived polyphenols. We specified which plant contains the most effective polyphenol for sunscreen. In order to do that, we determined the quantity of polyphenols extracted from each plant by the Folin-Denis method, and measured its effect in terms of ultraviolet protection and antioxidation using the DPPH method. The sample of extracted rosemary showed the highest absorbance in the ultraviolet region, and through the DPPH method, we also got a high radical scavenging rate. In addition, the skins of the plants showed higher defense rates than the inside portions. Considering the results, we can make sunscreen which is better for the skin than the ones on the current market, and also we can make use of peels which are usually thrown away, so this will be able to help protect the environment.

Keywords: polyphenol, ultraviolet, DPPH, Folin-Denis, sunscreen

The Ultimate Fire Extinguishing Method

Yuya Sakurada, Kota Yamazaki, Komi Yamada, Watraru Yoshida

Abstract

Sound waves cause the density of air to change. When several sounds occur contemporarily from each sound source, the sounds interfere with each other. Therefore, a fire placed in an appropriate coordinate where sounds strengthen each other will be bound to go out. We can calculate this by using the graph application, Geogebra. We made four sound sources, whose frequency was 340Hz, simultaneously occur by hand and observed the candle flames. Our results showed that the fire did not go out and the fire tailed toward the origin. These results indicate that many conditions were not accurate: the timing when sounds occurred and resounded, the attenuation and velocity of sounds, thus the amplitude of sounds was not enough to extinguish the fire at the coordinates.

Keywords: interference of sounds, extinguishing fire

Study on Protective Structure Utilizing Egg Drop Experiment

~The relationship of the sheltering structure, falling speed, and egg cracking~

~

Taichi Harada, Ryunosuke Kato, Seio Sanso, Kohsuke Yoshikawa

Abstract

To study of the idea of protective structure, we aimed for the success of an Egg Drop, which is a challenge to protect a falling chicken egg with paper. We decided to make a conical shelter because this shape is easy for us to make a lot of shelters. For the first time, we succeeded in protecting an egg with a shelter whose generating line was 18 cm by creating a stand to absorb the impact of falling. Second, we conducted further research by placing a weight on a stationary egg. As a result, we understood that eggs cannot withstand a force generated from a weight of about 2,327.5 grams. Finally, we tried to carry out the egg drop by decreasing the speed itself with some equipment such as parachutes. To succeed, we conducted research by placing weight on a stationary egg. By using a parachute, we increased the air resistance and the speed of egg had decreased by about one forth, but we couldn't prevent it from breaking. There was a crack in the whole part where the egg touched the ground. As a result, we concluded there were some problems such as posture stabilization to protect an egg without a stand.

Key words: egg drop, protect structure, air resistance, conical shelter, decreasing speed

Reverse of the Doppler Effect

Takuto Goto, Ryotaro Ozaki, Syota Sakai, Takaki Shirakura

Abstract

The Doppler effect is a phenomenon that exists in our immediate environment. We wondered if the Doppler effect could be canceled by some method and we set this as a theme. We created a dolly, a device to pull the dolly and an AD sound. These were the main experimental instruments in this study. The AD sound is an abbreviation for the Anti-Doppler sound. We ran the dolly while making the AD sound and checked if the observed frequency was constant. The results showed that the observed frequency was constant locally but either increased or decreased for the most part. Therefore, we conclude that the AD sound only worked locally and could not work in the long term. Based on these findings, we plan to make a slight modification to the AD sound, considering a method of frequency analysis, and carefully examine environmental factors such as noises and experimental procedures in our study.

Keywords: Doppler effect, frequency, constant, reverse, AD sound (Anti-Doppler Sound)

Measurement of Silver Ions Adsorption Rate to Montmorillonite

Haruka Kawashima, Suzuno Nishida, Mamiko Takeda, Emi Yoshida

Abstract

In the 1960s, NASA gave astronauts meals which included montmorillonite clay in order to prevent calcium deficiency. Following this example, we wanted to make montmorillonite contain more nutrients, and we tried measuring the mineral adsorption rate into montmorillonite. In this experiment, we mixed silver ions into montmorillonite and then measured the silver ions adsorption rate by argentometry. Our results showed that in the case of AgNO_3aq with a concentration of 1.0×10^{-3} mol/L, when the concentration of NaClaq was 1.8×10^{-3} , 1.8×10^{-2} and 1.8×10^{-1} mol/L, there wasn't any precipitation produced. However, when the concentration of NaClaq was 1.8 mol/L, there was precipitation of silver ions from the solution which passed through montmorillonite. In the case of AgNO_3aq 1.0×10^{-2} mol/L, where the concentration of NaClaq was 1.8×10^{-3} and 1.8×10^{-2} mol/L, there was precipitation of silver ions from the solution which passed through montmorillonite. These results indicate that the limit of adsorption exists when the concentration of AgNO_3aq is higher than 1.0×10^{-3} mol/L and lower than 1.0×10^{-2} mol/L, and montmorillonite doesn't absorb all the silver ions when it is too high.

Keywords: montmorillonite, argentometry, silver ions

Research into conditions that cause chlorophyll to emit red light

Ryouta Ichikawa, Takuma Tsuchihashi, Saya Hirao, Rin Murakami

Abstract

When exposed to ultraviolet rays, chlorophyll emits a red light. Chlorophyll can be extracted from plants using an organic solvent. Our purpose is to make a paper which sends out red light by using these principles. We extracted chlorophyll from *komatsuna*, spinach, or seaweed into diethyl ether or salad oil or water, and we soaked filter papers in each solvent. Finally, we carried out an experiment whether these filter paper sends out red light or not when they are exposed to ultraviolet rays. The results indicate that the red light fades away as the organic solvent evaporates, because the combination of chlorophyll molecules change by whether chlorophyll is wet or dry. This is not because chlorophyll releases its own magnesium ion to the organic solvent. Therefore we won't create a dry paper which gives off red light unless we can discover how to keep the combination of chlorophyll molecules when dry.

Keywords: ultraviolet ray, chlorophyll, magnesium ion, red light

How does the Zebrafish recognize this colorful world?

Tomoka Iida, Rei Kataoka, Yoshino Kawaguchi

Abstract

Human beings have three kinds of visual pigments, but zebrafish have four kinds of visual pigments, so we supposed that zebrafish can distinguish colors as well as or better than humans can. We did an experiment to observe their identification of color; when we showed zebrafish red displayed on an iPad, we fed them, and when we showed zebrafish blue, we gave electronic shocks to them. We did it for six weeks. Thereafter, we showed them red or blue displayed on an iPad (no feed or electronic shocks), and we measured the number of zebrafish which swam towards each color. Our results showed that zebrafish approached the red, but they didn't approach blue. From these results, we conclude that zebrafish distinguished blue from red, and that zebrafish recognize that they get bait when they approach red, and they are given electronic shocks when they approach blue. This indicates that zebrafish can distinguish colors.

Keywords: zebrafish, visual pigments

Making Eco-friendly Detergent

~By using plants which contain a lot of Saponins~

Haruko Iwai, Haruka Maeda, Sayaka Uchida, Yuka Umeya

Abstract

The purpose of this research is to make eco-friendly detergent from plants and to compare its detergency with that of standard detergent. We were interested in environmental problems, so we began with a washing method which is familiar to us. First, we made extractions from plants which contain a lot of Saponins. Saponins are a class of chemical compounds that have hydrophilic and hydrophobic parts. Second, we washed stained clothes using them. Finally, we measured the brightness and chroma with a chromometer. Our results showed that the extractions made from soy beans and carrots were the most effective. However, there were no extractions that have more detergency than standard detergent. These results indicate that making use of extractions as a detergent is difficult. Particularly, extractions made from golden shower tree, which we predicted to be very effective from our preliminary survey, turned out to be useless. It is because natural dyes from the Golden Shower Tree polluted the cloths and colored them.

Keywords: saponins, eco-friendly, Golden Shower Trees, detergent

The Idea Hidden in a Pack of Raw Fish

Ryota Nakae, Gota Oketani, Yuichiro Shikata, Yuya Watani

Abstract

We thought that what is included in a pack of raw fish, such as wasabi and soy sauce, radish, and shiso may be not only for improving the taste of raw fish and getting rid of the smell, but also for killing bacteria and keeping bacteria from developing. So we examined the effect of disinfection and the antibacterial properties that wasabi, and soy sauce, and the mixture of them have by using colon bacilli. The purpose was to check whether the mixture of them has the multiplier effect which multiplied the effects of wasabi by that of soy sauce. As a result, we observed there is no colony in the 45 percent of the whole medium of wasabi, and there is no colony in 40 percent of the whole medium of soy sauce, there is no colony in the 50 percent of the whole medium of wasabi and soy sauce. So, we checked the disinfection of wasabi and soy sauce, the mixture of them, but we couldn't discover the multiplier effect that we expected. We found we must check whether wasabi and soy sauce influence other bacteria, because we examined the effect only on colon bacilli, so we conducted an experiment of examining the effect of wasabi, soy sauce, and a mixture of them on air floating bacteria.

Keywords: disinfection, antibacterial property, colon bacilli, wasabi, soy sauce

Does artificially introduced panic infect neighboring fish?

Iroha Hirata, Naoharu Kurahashi, Taito Sakurai, Ayane Ubukata

Abstract

A previous study indicated that zebrafish watching calm individuals of the same species showed a smaller anxious reaction even in water containing alarm substance that fish secrete when they are injured. Therefore, we decided to reveal whether fear spreads out or not by watching in zebrafish. First, we put one and two zebrafish in two tanks A and B, and left them for 15 minutes. Second, we observed Fish 1 (in tank A) for about 5 minutes. Finally, we put 0.5ml alarm substance into tank B (2 fish), and observed Fish 1 (in tank A). We regarded a state swimming longer in the lower portion of the tank (about 3/8 down or lower) than normal as “diving”, and being still for at least 1 second as “freezing”. Then, we measured the time of each state. Our results showed a ratio of the diving time after putting alarm substance was higher than before in all eight experiments. Furthermore, in four experiments, “freezing” was observed after putting alarm substance in the tank. From these results, we conclude that zebrafish (in tank A) act as if they felt anxious when they saw other individuals feel anxious by the alarm substance. In other words, in zebrafish, fear can spread out by watching other individuals.

Keywords: zebrafish, alarm substance, anxious reaction

Study of Caddisfly Silk

Ayana Horii, Hina Matsuzaki, Nozomi Shimada, Eri Tsuchiya

Abstract

Caddisflies are a group of insects and the larvae build their nests using caddisfly silk and small stones in the water. We expected the caddisfly silk to have potential as a waterproof adhesive and tried to find something that would help its development. We collected *Stenopsyche marmorata* larvae living in the Kamo river and examined the nature of caddisfly silk by studying its resistance to heat, acid and base, or salty water and what material it can stick to. Furthermore, we observed the process in which the larvae built their nests in order to understand their habitat and specified the components by analyzing its adhesive side with Energy Dispersive X-ray Spectrometry (EDS). We soaked caddisfly silk in solutions from pH 1 to pH 13 and found caddisfly silk was resistant to acid, but was vulnerable to base and started to lose its original form around pH 11. By fluxing the end of caddisfly silk, caddisfly spread the adherend and bonded their silk to sheets made of vinyl chloride. By analyzing data from EDS, we found a lot of carbon and phosphorus in the part that we thought of as an adherend and there was a lot of chloride and palladium around it. In order to use caddisfly silk as the next generation of medical adhesive, we should investigate the reason why caddisfly silk is strong in the water, what elements or compounds are involved, and what causes its change as caddisfly silk is soaked in salt water.

Keywords: caddisfly silk, larvae, *Stenopsyche marmorata*, Energy Dispersive X-ray Spectrometry (EDS), salt water

Realization of Making on “Algae Green Curtain”

Hayato Inoue, Moeka Oki, Ayaka Ogasawara

Abstract

A green curtain (Japanese natural shade) is seen in Japanese summer. It helps to reduce CO₂, and is often made with vines which must be watered every day. Photo plankton, however, is easier to keep than vines, and can live not only in summer but also in winter. We planned to keep *Euglena* in a paper diaper, which can absorb water so that we would not need to water it frequently. Our results showed that algae (not *Euglena*, considered to be contaminated with *Euglena*) appeared on the paper diaper. Also, the population of the algae was small under the dry condition. From these results, we conclude that the algae can spread on the paper diaper. In addition we have to protect the algae from getting dry in order to keep them. In the future, algae may be able to be used as a green curtain.

Keywords: algae, greenhouse effect, photosynthesis, *Euglena*

Searching for the Connection between Form of Scales and Habitat of Largemouth Bass

Mione Maruta, Yui Tomimatsu, Yosuke Yamada

Abstract

In recent years, invasive fish species have caused problems. Their rapid increase in number has put native fish species at risk. We decided to examine the behavior of invasive fish species, especially largemouth bass, for it is a large fish. To examine its age or habitat, we conjectured that we could use scales instead of otolith, and we carried on the investigation according to this hypothesis. In this research, we caught largemouth bass from Hasu Pond of Lake Biwa in Shiga and Kizu River in Kyoto. Then, we examined the area differences of its scales and the correlation between bony scales and physical features by measuring the radius of bony scales and the number of ridges. As a result, we could not see differences and correlations between the width of a bony scale's ridges of largemouth bass in Kizu River and that of those in Hasu Pond, however, we could see correlations between the number of ridges and a standard length by comparing the number of ridges with a radius of a bony scale. These results indicate that the research of largemouth bass' habitats by using their bony scales can be used as an effective barometer for the behavior of fish.

Keywords: largemouth bass, bony scales, ridge, Lake Biwa, Kizu River

The Use of Instagram among High School Students ~ Differences between Genders ~

Yuzuki Hatanaka, Rina Mitsunaga

Abstract

Instagram is an application that specializes in sharing pictures. According to research by Nielsen Corporation in 2017, 360 million women under age 29 use Instagram, while only 219 million men do. Therefore, we suppose that more than half of high school students use Instagram and girls tend to use it more actively than boys. To prove our hypothesis, we sent a questionnaire to 230 2nd grade students in Rakuhoku High school. Our results showed that 98% of Rakuhoku High School 2nd grade students know of Instagram, but the user proportion is only 56%. It also turned out that 68% of girls use Instagram, while 43% of boys do. The number of girls who answered “I want to use it in the future” is about three times as high as boys. These results indicate that Rakuhoku High School students don’t use Instagram for its recognition, and girls are more likely to use it than boys.

Keywords: Instagram, high school students, differences between boys and girls, inquiry survey, SNS

***Ikezu* makes human relations smooth!?**

~Verification by Literature Survey and Interview~

Kazuha Uchida, Shiori Yamakawa, Eri Yokawa

Abstract

At first, *Ikezu* is an indirect expression of a traditional linguistic culture in Kyoto. In the research, we examined the current situation of *Ikezu* and the connection between *Ikezu* and human relationships by looking up literature and conducting interviews with people who were born and raised in the area where Kyoto dialect remains. As a result, it turns out that use of *Ikezu* has decreased, but it is used in some areas such as Nisijin and Muromachi nowadays. Moreover, *Ikezu* can be useful to prevent people from confrontation. That can be helpful to ameliorate the narrowing of human relations due to use of SNS in recent years.

Keywords: *Ikezu*, Kyoto, culture, communication, human relationship

Survey Targeting Foreign Tourists toward Sightseeing Promotion in Osaka Castle

Honoka Koyama, Marina Yamamoto

Abstract

We have been interested in the beauty of Osaka Castle and wanted to promote the tourism industry of Osaka. In this study, we sent a questionnaire to foreign tourists and interviewed free volunteer guides around Osaka Castle. As a result, we found some issues for example, low name recognition of the free volunteer guides and some obstacles to comfortable sightseeing, such as lack of language and information in instruction panels. We suggest that NPO Osaka Volunteer Guide Council should begin to charge for guides in order to solve those problems. By spending profits made by paid guides to maintain Osaka Castle, it can solve the above issues and increase public relations activities, so further tourists will visit Osaka Castle.

Keywords: Osaka, foreign tourists, interview, tourism industry, Osaka Castle

Projection of a Parabola onto a Sphere

Kanna Yamaji

Abstract

I was curious about the form when I saw a parabola spreading infinitely, and at that time, the view point was from above, and the parabola was projected from a plane onto a sphere.

My Method was to consider a parabola defined by $y = x^2$ and calculate the trace of point that is an intersected a line segment connecting the point P which is on $y = x^2$ and the origin $(0,0,0)$ on the spherical surface $x^2 + y^2 + z^2 = 1$. Next, I calculated the curvature, transfered the shape from the spherical surface to a flat surface $Z = y + \sqrt{2}h$, and calculated the inner product of various functions.

Our result shows that this form becomes $\frac{y^2}{h^2} - \frac{2x^2}{h} = 1$, and because h is a negative number, it turned out to be an ellipse, if it is a conic curve such as a parabola or a hyperbola, the shape appearing on the plane takes the form of a conic curve.

The result indicates that the inner product approaches -1 at a certain point on the function where there is a high rate of increase.

Keywords: curvature, inner product

Linear regression using X and Y equally

Hiromasa Hoke

Abstract

To calculate linear regression, the least squares method is used in general, but this method is used to predict Y against variable X, so for this research I calculated linear regression treating X and Y equally. My results showed that the linear regression which we want to calculate is $Y=aX+b$, n points which are different from each other are $a_1(x_1, y_1), a_2(x_2, y_2), \dots, a_n(x_n, y_n)$. (but $x_1 + x_2 + \dots + x_n = 0, y_1 + y_2 + \dots + y_n = 0$). At this time

$$a = \begin{cases} \pm\infty((A < C) \cap (B = 0)) \\ 0((A > C) \cap (B = 0)) \\ \frac{2B}{A-C+\sqrt{(A-C)^2+4B^2}}(B \neq 0) \\ \text{All real number}((A = C) \cap (B = 0)) \end{cases}, \quad b = 0$$

,and in the n dimension, the linear regression which I want to calculate is $l: (a_1, a_2, \dots, a_n)$, but $\sum_{k=1}^n a_k^2 = 1$. And n points are $P_i(b_1^{(i)}, b_2^{(i)}, \dots, b_n^{(i)})(i=1,2,\dots,n)$. (but $\sum_{i=1}^n b_k^{(i)} (k = 1,2, \dots, n)$) At this time linear regression is (a_1, a_2, \dots, a_n) which maximizes $\sum_{i=0}^n \left\{ \sum_{k=1}^n (a_k b_k^{(i)}) \right\}^2$. These results indicate that I can calculate a linear regression using X and Y equally in the n dimension, but the merits in this linear regression cannot be showed compared with the least squares method.

How to Make Equally Likely 7-sided Dice

Yuka Fujiwara, Asaki Nakai, Yuto Osugi

Abstract

We wondered why there are no 7-sided dice though there are 6-sided or 8-sided dice and tried to make 7-sided dice. We constructed two hypotheses and inspected them. One is that the dice whose sides have the same area are equally likely to provide any result when rolled. The other is that the dice whose sides have the same sum of length along the edges will provide equally likely values when rolled. First, we examined 7-faced objects and chose three objects for the research and we decided to study hexagonal pyramids, pentagonal prisms and objects that are triangular pyramids integrated with triangular prisms this time. We made 7-sided objects using a 3D printer and rolled them. We calculated the 95% confidence interval. If in the interval, we increased the number of terms of rolling so that the section width was 1%. Our experiments showed that one of the pentagonal prisms would fall in the 95% confidence interval. These results indicate that our hypotheses were not right but we were able to make 7-sided dice which could be used in our lives.

Keywords: 7-sided dice, equally likely, hexagonal pyramids, pentagonal prisms, the 95% confidence interval