5th IYNT 2017

Invent Yourself problem statements for Science Fight 3

As of June 29, 2017, 18:00. Original spelling and punctuation preserved

Belarus-Pahonia

1. There is a joke that during software development optimists multuply initial time estimation by e, pessimists by Pi to obtain real time requirements. Please investigate with which probability these two koeffitients cover overall time requirements.
2. Use the timelapse photography to visualize capability of the moving daisies.
3. Investigate which conditions are optimal for cooling down objects using concave mirrors. What is the maximum temperature difference which may be obtained using this method?
4. Check whether it is better to learn Belarussian instead of Russian to understand more Slavic languages. Which languages are the closest to Belarussian and Russian?
5. Is it true that during the science fight last report usually gets the grade higher than average?

Bulgaria

1. Investigate how the humans perceive a book which they see for the first time and a glass of water.
2. Investigate the duirnal motion of celestial objects, using a time-lapse video. What can you find from this video?
3. Demonstrate, using concave mirrors, how heat could be transferred from a hotter to a cooler object.
4. Investigate quantitatively to what extent native Bulgarian speakers can understand Serbian and Croatian language.
5. Investigate if the grades from the previous IYNTs follow a Gaussian distribution or not. What conclusions could be made, based on this investigation?

China-NFLS Unique

1. We let 2 groups of people (a group of children and a group of adults) estimate the length of a pen. The results confirm the guess. At the mean time we also found that the average of the data can improve the guess.
2. We use the technique of time-lapse photography to observe the process of plant germination and to study the condition factors of seed germination, including both internal and external ones.
3. We use convex lens to cool and concave lens to heat. In the experiment part, we change the distance between lens and thermometer and compare the results and find out which factor influences the heating temperature.
4. We use intonation, gesture and facial expression as parameter to study the communicating possibility of speakers with different languages or dialects.
5. We put the 4000 data into SPSS, and have a look at the frequency of outlier.

China-NFLS LaplaceWitches

1. Make an experiment about asking students to guess the number of candies in a jar. (The parameter is the number of candies in the jar)
2. Use time-lapse photography to record the process of the crystallization of storm glass. Discuss the principle and the accuracy of the storm glass.
3. Use the converging of the concave mirror to assemble the lights in order to heat up objects. Use the energy collected from the converged lights to run refrigeration equipment in order to cool down objects.
4. Explore how well can people speak Sewdish, Danish and Norwegian understand each other and why. Also research it by measuring the lexical and phenetical distances between them which greatly influences the result.
5. Show how can calculate the grades and get the rank by computer programming and some important parts of the application framework.

China-Qingdao No. 2 Middle School

1. We made a questionnaire and found a group of students to guess the number of pages of a book . To find out the influence factor, we used different kinds of books and try to give them different information of each book,and we collect every student's experience about reading book.

2. We recorded and study the natural evaporation crystallization phenomenon of sodium chloride solution and Copper sulfate pentahydrate solution by using time-lapse photography.

3. We built a sun oven in order to prove that large concave mirrors can be used to heat up various objects and that light which parallels the principle axis all converges at the focus

We also did some experiences to determine the position of the focus and prove that the temperature of the focus is the highest.

4. Speech comprehension can be regarded as the product of combining the signals with knowledge.Find the effects caused by the word recognition,speed,context,tone, grammar and other possible factors.

5. the offical website offer all 7 scores related to the medal. I believe the problem wants us to find out how these scores combine and what parameters are given to each score to give a final score related to medals.

China-RDFZ

1. We have conducted an experiment to guess the circumference of the parterre.The parameter has been chosen and measured as the circumference . Questionnaires are designed with reward to collect the data.Medians in each groups of data are picked and analyzed its frequency falling into the prescribed limits.

2. I. Experiment target: use the Time-lapse video to visualize a slow phenomenon.

II. Experimental supplies:Time-lapse camera,Drosera Capensis.

III.The principle of Time-lapse camera: take photo at regular intervals automatically.

IV. Experimental method:

1.Put the Drosera Capensis under the Time-lapse camera.

2.Open the camera, take photos for 10 hours .

3.Use the photos to make a video.

4.Observe the video.

3. I. Experiment target: discuss if and how a concave mirror can heat up an object.

II. Experimental supplies: Concave mirror, Iron basin, Water, Thermometer

III. Experimental method:

1. Assemble the equipment;
2. Face the mirror at the sun and find the focal point;
3. Put the basin on the pot stand. Add 2 litre of water;
4. Take the temperature every 5 minutes.
5. (Theoretically calculation and research)

4. We record a speech of several persons in different dialects and pose these on the Internet. A questionnaire is carried out, in which hundreds of persons are invited to listen to these speeches and restate the speech in their own language. The original speech and restatement are compared to seen the how well the audiences understand the original speeches. Furthermore, the audiences are invited to write down why they can understand the original speech. From their answer we find out some factors which may help us overcome the language barriers.

5. We hypothesized that the scores should be fair at reflecting the teams' ability and predicted that the scores should form a normal distribution. We fully utilized most scores of all tournaments to testify this hypothesis, drawing graphs and analyzing using computer devises and theories that are generally accepted.

China-Shenzhen Middle School Team 1

1. People deal with weights and heights almost everyday, but it’s confused of people about the clear standard of how long one centimeter or how heavy a kilogram is. Since everyone knows the exact value of their own heights and can accordingly assess others’, we’ll investigate how the familiarity of individuals will influence the accuracy of their guessing.

2. Paper may wrinkle after they are soaked into water, however, for different kinds of paper, their wrinkling processes may vary greatly. Because the phenomenon is relatively slow, a time-lapse video may help to watch, as well as study, the whole periods efficiently and conveniently.

3. Concave mirrors can gather passing light to a small point, so called focus. Using this phenomenon, investigate whether it could help to heat up a small amount of water. Convex lens can also gather light; among them, investigate which kind of optical equipment is more useful.
4. Dialects have their own special expression of some specific words or phrases. Among all Chinese dialects, identify the most and the least frequent word that has other expressions except for Mandarin.
5. For science fight, investigate whether the latter teams would get a relatively different grade than the former teams. If so, identify what is the tendency of grading.

China-Shenzhen Middle School Team 2

1. A remarkable concurrence of the statistics may be emerged when several people guess the same object's length, mass, etc. This can directly catch one's eyes and Francis Galton observed a contest connected to the coincidence. The most surprising thing was that the median of the guesses was only 8% of the true measured weight. We made an partial reproduction of this experiment and got a similar results of this question.
2. As digital technology develops leaps and bounds, time-lapse photography has been put into application in various areas. With this technology, people are able to visualize all types of slow processes through the use of simple everyday devices such as video cameras or just smart phones. Have you ever seen videos showing a silkworm changing from a chrysalis to a moth, or the melting of polar ice caps in the past few decades? Time-lapse videos provide people not only with astonishing visual effects, but also with great opportunity to study very slow physical, biological, or chemical processes. Now we are going to present you with some interesting time-lapse videos that have helped us learn about scientific phenomena.
3. Concave mirrors are not strange to most people. There was a famous story that the Greeks used a number of mirrors to form a parabolic curve and successfully lit up the ships of their foes - the Romans. At present, people in remote areas still use large concave mirrors to boil water in sunny days. Here we also demonstrated some experiments in which concave mirrors were used to heat up and cool down different objects.
4. It is an amazing thing that people using different dialects or languages can sometimes understand each other without any prior study. Similarities in origins of languages contribute to this interesting phenomenon. However, experiments showed that in certain cases, the intelligibility is not mutually equal. We studied this phenomenon using several dialects of Chinese as examples. Some dialects of Chinese are indeed different from each other, but there are interesting intelligibilities between them. We tried several parameters to achieve quantification in this experiment. With quantitative parameters, the intelligibility can be noticed and demonstrated more clearly and rigorously.
5. Does the average grade has a trend as IYNT competition processing to final? For example, will it increase or decrease when it approaches to final science fight?

Croatia

1. In this investigation we wanted to see how accurate estimation can be. To check this, we tested how different groups estimate different parameters and checked the influence.of parameter itself, group size and expertise of examinees.
2. Solar flares are sudden flashes of light and gas near the sun surface. Sudden actually means "tens of minutes". From sun photographs we obtain a timelapse video and study kinematics of solar flares.
3. efficiency of heating object using curved mirrors is investigated, with aim to maximize heating power.
4. Examine mutual intelligibility of south slavic languages. Does it depend on their relatedness or geographical proximity?
5. Investigate differences in strictness between grades of different jurors. Examine the possibility of bias in grading.

Georgia-Georgians

1. We conducted polling in measuring the mass of known objects (such as apples, grains), measuring the mass of the object without direct contact and we asked people to evaluate the number of product. Our experimental subjects were both professional and inexperienced people in given matter. We analyzed the results and made conclusions according to it.
2. We chose to study several phenomenon using time-lapse photography. We study Wheat growth, the browning of an apple, withering of flower, rusting of metal and the chemical reaction caused by placing a piece of oak in alcohol. We analyze each phenomenon and explain it theoretically.

3. We used concave mirrors in our experiments to heat up and then cool down metal objects. Also, we conducted experiments with several flat mirrors and showed that concave mirrors are not necessary to heat up objects with sunlight. Our physical theoretical model was compared to experiments.
4. We examined three pairs (Turkish and Azerbaijanian, German and English, Spanish and Italian) of "neighboring" languages using their vocabularies. We wrote a program which counts related words according to our parameters. Also, we examined languages which have similar pronunciations, such as Georgian and "megruli" (this language is spoken in west of Georgia).
5. We analyzed IYNT grades according to year, tournament stages (Sf1, semi-finals, finals), roles in science fights and also we made analyzes according to Jurors (team leader and independent jurors). We make several hypothesis according to the results we obtained.

Indonesia-Labsky

1. Research about Francis Galton and other experts' opinions and theories was carried out to determine categories used for the subjects in our experiment/survey. A survey was then conducted based on the selected categories using the same parameter. Results were calculated and compared to the theories we have researched earlier.
2. Research about Physical, Biological or Chemical phenomenon was conducted. We finally choose to conduct an experiment about Recrystallization of Copper-Sulphate. Photography of Time-Lapse was taken during our study.
3. Some colors absorb more heat than the others and different materials have different melting/ignition point. Using concave mirrors, we found out which colors absorb more heat and what materials have the lowest melting/ignition point.
4. We tested 2 pairs of different but related languages from Indonesia with native speakers. Two methods were used: Opinion Testing (spoken) and Content Questions (written) to measure mutual intelligibility. The results are explained theoretically.
5. Hidden properties and Regularities of previous 4 IYNTs grades have been revealed, using analytical study using normal distribution equation about IYNT Grades and grading criteria. Research based on internet was conducted to strengthen and prove our hypothesis.

Iran-AYIMI

1. Galton by an impromptu experiment organized and ran a series of statistical tests to arrange the guesses of farmers on animals' weight. Breeding mattered to Galton because he believed that only a very few people had the characteristics necessary to keep societies healthy. He had devoted much of his career to measuring those characteristics, in fact, in order to prove that the vast majority of people did not have them.
2. A very slow phenomenon is investigated experimentally to check out the reasons and finding the parameters during the days or several times. Taking videos and photos will demonstrate the changes perfectly.
3. The concave mirror is a converging, so that it is used for many purposes. It is used as a torch to reflect, in the aircraft landing to guide the aero planes in shaving to get an enlarged and erect image of the face. In the solar ovens and the solar furnaces to collect a large amount of solar energy in the focus point are used for cooking food or heating water. But for cooling objects we can do it with Energy conversion by a thermo-electric cooler.
4. an adult age who come to a new country or those who study in abroad can have particular difficulty "overcoming the language barrier". So to make it easier we can find parameters which is common in body language and real words and also some common words which are spoken in different nationalities.
5. Some parameters are related to appearance, how to dress, to make an innovative PowerPoint but about the articles and devices it is necessary to avoid using unrelated content, if there is a device ability to mass production and several other parameters. But the most important part on this competition is the discussion between Rep. and Opp.

Kazakhstan-Bobek.kz

1. Invent yourself: Good guess

1. In 1906, Francis Galton observed a contest where 800 farmers guessed an animal`s weight. To his surprise, the median of the guesses was within 0.8 % of the true measured weight. What is the chance of obtaining such a good match by coincidence? Select an interesting and important parameter, measure it directly, and give a group of human observers the task to guess the value of the parameter. Discuss the results of your experiments.

My plan of action:

1) To select a quantitative characteristic;
2) To be measure the quantity of the measured object;
3) To conduct a survey;
4) Calculate the results;
5) Drawing a graph of the distribution.

In the form of our quantitative characteristics, I took candy. I measured 1,45 kg. I interviewed fifty random passers-by and fifty sellers.

According to the results of the survey, it turned out that on average, sellers were mistaken in the mass of candy at four percent, and passers-by were mistaken on average by twenty-six percent.

After filling the table with the results of the survey, was constructed the graph of the distribution which showing that the responses of the sellers were the closest to reality.

2. Invent Yourself: Time-lapse videos

Propose a very slow physical, biological, or chemical phenomenon that can be studied and visualized using time-lapse photography. Produce and demonstrate such a video.

I solved to add milk to Coca Cola, because I was interested to see the reaction. I set myself 3 purpose:

1. To take a 1 bottle of cola and to pour out some of the contents and then to add milk.
2. To take the photo or video of this process to camera (accelerated video)
3. To observation of the results.

In this video is shows the chemical reaction of cola with milk.

Why does this chemical reaction produce a precipitate (flakes), and the cola becomes pellucid?

The composition of the caffeine and acid that to indicate that the cola is acid medium, and milk is alkaline. The molecules of orthophosphoric acid enter into an oxidative reaction with milk and give a precipitate, as a result of which the cola becomes a transparent liquid. And we can to observe the floating flakes (sediment).

3. Invent Yourself: Curved mirrors

Suggest and demonstrate interesting experiments in which large concave mirrors can be used to heat up or cool down various objects.

We took two concave mirrors and placed parallel to each other.

1) Put the candle next to the first mirror
2) Put a thermometer on the contrary the second mirror
3) we ignite a candle and aim the beam reflected from the first mirror to the thermometer
4) Wait a few minutes
5) Get the result (rise in temperature on the thermometer)

How it works:

Really the radiation isotropic point source, a spherical reflecting mirror turns Really the radiation isotropic point source, a spherical reflecting mirror turns in a plane-parallel beam and comes in 1 mirror and this mirror focuses the beam at the source and we see how the sensor heats up the energy transfer from one body to another using infrared radiation from one of these two bodies.

Using the iron cups and liquid nitrogen. You need to wait a bit to the glass has cooled to a temperature of (-196 degrees Celsius). Put the glass near the focus of the mirrors and we see that the sensor has become cool.

What happens:

If anything here is not that balance when placing the beaker with nitrogen that is broken (why) come here background infrared radiation it absorbs this body, If it wasn't then coming here reference the infrared radiation reflected from the mirrors and came here in the end fall into the sensor that is using this body we have reduced the flow of energy in the thermosensor from the surrounding background infrared radiation, no rays cold no.

4. Invent Yourself: Language barriers

Speakers of related but different languages or dialects can sometimes understand each other, without any prior intentional study. Propose an interesting study of such mutual intelligibility. Investigate it experimentally for the pairs of dialects or languages of your choice. Introduce and determine quantitative parameters.

Take the 2 examples:

1) programming language
2) gestures and facial expressions

1) Programming language. A programming language is a formal language that is designed for writing computer programs. Programming language defines a set of lexical, syntactic and semantic rules that define the appearance of programs and actions,

which will perform a performer (usually a COMPUTER) under her control. Since the establishment of the first programmable machines mankind invented more than eight thousand languages. A programming language designed for writing computer programs, which are a set of rules that allow the computer to perform a computation process, manage different objects and other. Programming language differs from the natural language that is designed for COMPUTER control, while natural languages are used, primarily, for communication between people. Most programming languages, uses special designs for the definition and manipulation of the data structures and the management of computing. Modern software developers the most popular following the major programming languages. The list is in descending order of popularity:

1. SQL.
2. Java.
3. XML.
4. C++.
5. HTML.
6. Visual Basic.
7. XSL.
8. Delphi.

These languages are a bit similar and because of this, people can learn even if this person did not work on this program.

2) according to the research, only a tenth of a person transmits information words. The remainder is produced by gestures, facial expression and intonation. For the first intuitive "human" scanning needs approximately 10 seconds. People do not always say what they think, but the body doesn't lie. Hidden feelings find exit through gestures. Psychology of nonverbal communication is very wide and versatile. By learning to understand human gestures and their meanings, learn the truth will be much easier. When increased emotional background man, he stops to monitor his body. But when trying to unravel the thoughts and situational factors must be borne in mind that the judgment was correct. For example, if a person crosses Hill hands on breasts in extreme cold, this can only mean that he is cold and not the invisibility and Avoidant

5. IYNT GRADES

Results of the 2nd IYNT 2014

Final Rank	Lot	Team	Intro	SF 1		SF 2		SF 3		SF 4		After SF 4			Finals		After Finals		Medal
			SP	*SP*	*V*	*SP*	*V*	*SP*	*V*	*SP*	*V*	*TSP*	*SV*	*R*	*SP*	*V*	*SV*	*TSP*	
1	6	Georgia "Georgians"	9.50	46.62	0.5	46.30	1	41.30	0.5	46.90	1	190.6	3	**3**	50.50	**1**	4	241.1	
2	2	Bulgaria-Sofia	8.75	52.80	1	51.30	1	46.60	1	46.60	1	206.1	4	**1**	49.33	**1**	5	255.4	
3	4	Serbia	8.50	46.10	0.5	47.00	1	38.00	1	44.70	1	184.3	3.5	**2**	46.50	**0.5**	4	230.8	
4	3	Russia "Vinegret"	5.85	27.72	1	38.07	0	32.22	0	42.50	0.5	146.4	1.5	**4**			1.5	146.4	
5	1	Bulgaria-Kyustendil "Ruen"	5.00	25.50	0.5	33.10	0	16.80	0	33.00	0	113.4	0.5	**5**			0.5	113.4	

Sources of grading parameters: Andrey Kravtsov and Hieorhi Liaśnieŭski
Highlighted: Finalists were three top teams after four Selective Science Fights

Results of the 1st IYNT 2013

Final Rank	Lot	ID	Team	Intro	SF 1		SF 2		SF 3		After SF 3		SF 4		After SF 4		Semi-Finals		After S/Fin		Finals		After Finals		Medal
				SP	SP	V	SP	V	SP	V	TSP	SV	SP	V	TSP	SV	SP	V	TSP	SV	SP	V	TSP	SV	
1	11	505	Belarus-Universum	9.1	45.0	1	43.3	1	45.7	1	143	3	34.0	1	177	4	43.3	1	220	5	50.8	1	271	6	
2	10	506	Georgia-Raveko	7.9	46.3	1	36.5	1	44.0	0.5	135	2.5	39.7	0.5	174	3	45.1	1	220	4	42.8	0.5	262	4.5	
3	7	516	Turkey-Bahçeşehir	7.3	40.0	1	39.4	1	45.2	1	132	3	41.9	1	174	4	38.3	0.5	212	4.5	37.2	0	249	4.5	
4	3	509	Moldova-Eco Gener'n	8.4	26.2	1	36.3	0.5	39.4	1	110	2.5	44.3	1	155	3.5	41.7	1	196	4.5	36.4	0	233	4.5	
5	5	503	Russia-RLC	9.6	41.0	0.5	40.8	1	47.6	1	139	2.5	34.0	0.5	173	3	37.1	0.5	210	3.5			210	3.5	
6	1	504	Bulgaria-Bulgaria	7.0	31.4	0.5	51.0	1	43.0	0.5	132	2	37.6	1	170	3	39.1	0.5	209	3.5			209	3.5	
7	6	501	Russia-TMOLimpiycy	7.4	39.6	1	43.7	1	36.8	0.5	128	2.5	40.0	1	168	3.5	40.0	1	208	4.5			208	4.5	
8	2	511	Russia-MG 12	8.9	40.2	1	36.3	1	35.9	0.5	121	2.5	38.8	0.5	160	3	39.0	0.5	199	3.5			199	3.5	
9	9	502	Afghanistan-Ariana	8.2	18.7	0.5	41.8	0.5	42.2	1	111	2	44.6	1	156	3	35.8	0.5	191	3.5			191	3.5	
10	4	510	Bulgaria-Science Girls	7.4	42.6	0.5	31.5	1	43.1	1	125	2.5	28.8	0.5	153	3	32.5	0	186	3			186	3	
11	12	517	Turkey-Fatih Eskiş/	8.5	31.7	0.5	27.5	0.5	45.3	1	113	2	33.9	0.5	147	2.5							147	2.5	
12	14	508	Iran-Iran	7.7	31.0	0.5	38.1	0	41.0	0.5	118	1	28.1	0.5	146	1.5							146	1.5	
13	16	512	Kyrgyzstan-Alatoo	7.1	20.2	0	32.5	0	38.1	0.5	98	0.5	39.7	0.5	138	1							138	1	
14	13	514	Ukraine-Richelieu	7.6	25.4	0	36.5	0.5	31.8	0	101	0.5	36.2	0.5	138	1							138	1	
15	15	513	Kazakhstan-NIS DT	9.5	18.3	0.5	29.5	0.5	36.8	0.5	94	1.5	36.2	1	130	2.5							130	2.5	
16	8	515	Turkey-Samanyolu	8.3	21.1	0	28.3	0	24.5	0	82	0	25.7	0	108	0							108	0	

Sources of grading parameters: Andrey Kravtsov and Ilya Martchenko

so far we have found not all patterns

New Zealand-Wellington High School

1. Investigate influences on human observers guessing the value of a selected parameter to find how it can affect the chances of obtaining a good match at random. Discuss the results of your experiments.
2. Create a time lapse showing a slow biological phenomenon and study and explain what is happening in the video
3. Design and construct a device which lowers an object's temperature using concave mirrors
4. Speakers of two related but different languages may experience some degree of mutual intelligibility. Investigate this phenomenon theoretically and experimentally.
5. Combining the highest and lowest jury scores has no effect on the outcome of science fights, or IYNT final placings.

Russia-12FM

1. Temperature is one of the important values for the Siberians citizens. Investigate how people feel the temperature.
2. Observe and explain the process of crystal formation.
3. Investigate the possibility of using curved mirrors for the needs of the Siberian region.
4. A person can understand a foreign speech only if there are words the meaning of which he knows. Investigate factors that affect the number of related words in the lexical fund of languages.
5. Explore the dependences in ranking based on the fight's number and the phase in it.

Russia-5th Lyceum

1. Select the subject of everyday use, measurenits mass, and invite a group of people of the same age to guess the value of this value. Analyze the rezults of your experiment.
2. With the help of time-laps to investigate the rection of metal salts with silicate glue
3. Investigate the difference of the ways of heating and cooling of physical bodies with the help of curved mirrors. How to impact on the speed of heating.
4. To indentify the understanding level of representative of Slavic laguages group by Russian native speakers
5. Indentify the grades dependence on the subject of the problem based on past data of the IYNT.

Russia-Izolenta

1. Conduct an experiment similar to the Galton experiment in 1906, but with changed parameters. Build a theoretical model of your experiment and on its basis explain the similarities and differences between experiments.

2. Study the principle of operation and characteristics of video and quick video with example of crystal growth.
3. Raise the temperature of the object with using sun rays. To cool the object with using the freeze ray system. To study the dependence on the diameter of the mirrors.
4. When tourists from Russia go to Poland, Czech Republic, Ukraine or Bulgaria, they can understand a lot of what Polish, Ukrainians, Bulgarians or Czechs are saying. Why is it possible?
5. Explore the estimates of IYNT 2015. On the basis of the observed patterns, derive a general hypothesis that allows you to predict the estimates of the next steps with sufficient accuracy using the data from the previous ones. Check it with the IYNT 2014 ratings, confirming or disproving it.

Switzerland

1. Propose an experiment similar to the one in the task. Conduct the proposed experiments and analyse its results by stating own hypotheses and testing these statistically.
2. Produce a time-lapse video of the sky at night. Use this video to investigate the apparent stellar motion and determine interesting parameters, such as the position of the camera.
3. Investigate the heating and cooling process with parabolic mirrors in sunlight. Determine the heating and cooling effects achieved with respect to a reference sample.
4. Switzerland is known for its four national languages and its diverse dialects. Investigate how words of identical origin are pronounced within those languages and dialects. Determine whether or not there is a geographical dependency.
5. Propose a hypothesis on the IYNT grades and determine the validity using common statistical methods.