Team Mathematics Contest for 9th-12th graders

 Šiauliai Stasys Šalkauskis Gymnasium Award

 2022-11-17

 Tasks

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| No.  |  Tasks | Points  |
| 1. | It is known that chocolate makes our brain more active. So, the students coming to the mathematics extracurricular club activities bring chocolate sweets. During one of the meetings a teacher decided to calculate how many sweets the students brought. It came clear that at least 1 sweet was brought by 10 students, more than 1 sweet – 8 students, more than 2 sweets - 6 students, more than 3 sweets- 4 students, more than 4 sweets -3 students, no students brought more than 5 sweets. How many sweets did the students bring to the meeting? | 2 |
| 2 | What are the natural “n“ meanings to have the correct inequality  | 4 |
| 3 | A bunch of dills, tied with a thread costs 2 euros. How much would the bunch of dills tied with twice long thread cost? | 3 |
| 4 | Peter can mow a meadow in 10 days, if John helps him mow within 7 days. John can mow the same meadow in 12 days if Peter helps him 7 days. How many days will each of them need to mow the meadow if working separately? | 3 |
| 5 | The sum of two numbers is 50% larger than their difference. How many percent is their square sum higher than their multiplication? | 3 |
| 6 | Is there such a triangle which altitudes (heights) equal $1; \sqrt{5}; \sqrt{5}+1?$ | 4 |
| 7 | Nine the same pens cost 11 euros and several cents, and thirteen the same pens cost 15 euros and some cents. How much does one pen cost? | 3 |
| 8 | Let the sandwich falling down chance is $\frac{3}{4}.$ A waiter carries a tray with 7 sandwiches. When a waiter fall down, what is the chance 5 sandwiches fall butter face down? | 2 |
| 9 | Three women received 900 kg one kind of apples from one gardener and decided to sell them for the same price. At the end of the working day each woman had 20 kg apples left. How many kg of apples did each woman receive if the 1st sold apples for 80 euros, the 2nd for -280 euros, the 3rd for – 480 euros? | 2 |
| 10 | Solve this equation $\left(10x-5\right)^{2}\left(10x-4\right)\left(10x-6\right)=72.$ | 3 |
| 11 | Sisyphus rolls a stone up a top of a mountain. The 1st day he rolled up the mountain road 60 meters. Everyday he rolled up the stone one third less than the previous day. The length of the road Sisyphus rolls up a stone is 190 meters. Which day will Sisyphus reach the top of the mountain?  | 3 |
| 12 | Points $A\left(-1;y\right) and B\left(x;4\right)$ are curves $y=x^{3}-3x+2$ graph points. Point O is a starting point of the coordinates. Calculate vectors $\vec{OA}$ and $\vec{OB}$ scalar multiplication, that is $\vec{OA}∙\vec{OB}$.  | 3 |
| 13 | The function $f\left(x\right)=\frac{\left(x-a\right)\left(x+4\right)}{x+7}$. Which “a“ meanings inequality $f\left(x\right)<0$ answers set is a ray with? | 3 |
| 14 | Solve the inequality $\frac{\frac{1}{x-5}-1}{1-\frac{1}{x-8}}\geq 0$ | 3 |
| 15 | Four boys Tom, Ben, Robert and Steve participated in a tug of war. Ben alone defeated both Tom and Robert who were fighting together. If in one side there are Tom and Ben and in the other – Robert and Steve noboby wins. Steve and Tom defeat Ben and Robert easily. Find out who is the strongest and who is the weakest, and who according to the strength will be in the 2nd and the 3rd position. | 4 |
| 16.  | A passenger travelling from city A to city B half of his trip time travelled by bus, the rest of the trip – by car. If he travelled from city A to city B only by bus, his trip will last 1.5 ( one and a half) time longer. How many times quicker a passenger will arrive at the city B travelling only by car rather than only by bus? | 3 |