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**ПИСЬМЕННАЯ РАБОТА УЧАСТНИКА  
ОЛИМПИАДЫ ШКОЛЬНИКОВ СПбГУ  
2018–2019**

заключительный этап

Предмет (комплекс предметов) Олимпиады

СОВРЕМЕННЫЙ МЕНЕДЖЕР

Город, в котором проводится Санкт-Петербург

Дата 16.03.2019

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**ВАРИАНТ 5**

**МАТЕМАТИКА (СОВРЕМЕННЫЙ МЕНЕДЖЕР)**

*Для каждой из сформулированных задач приведите полное ее решение и запишите ответ.*

1. (6 баллов) Найдите сумму корней уравнения

$$(x+1)(x+2)(x+3)(x+4) = 24$$

2. (6 баллов) Сколько корней имеет уравнение  $\cos(\pi/(x+2)) = \sin(\pi x)$  на промежутке  $[0; 10]$ ?

3. (6 баллов) Найдите наибольшее значение функции

$$f(x, y) = \frac{x\sqrt{y-2} + y\sqrt{x-2}}{x^2 + y^2}$$

4. (8 баллов) В параллелограмме одна из диагоналей равна боковой стороне и равна 4, а другая диагональ является биссектрисой двух углов параллелограмма. Найдите его площадь.

5. (8 баллов) В кубе  $ABCD A'B'C'D'$  точка  $P$  лежит на ребре  $B'C'$  и при этом  $B'P:PC' = 1:2$ . Через точки  $B$ ,  $D$  и  $P$  проведена плоскость. В каком отношении она делит объем куба?

**Решения заданий:**

$$\textcircled{1} \quad (x+1)(x+2)(x+3)(x+4) = 24$$

$$x=0$$

$$1 \cdot 2 \cdot 3 \cdot 4 = 24$$

Утверждений вериз следов.  $x=0$  - корень ур-а.

$$x=-5$$

$$-4 \cdot (-3) \cdot (-2) \cdot (-1) = 24$$

Математика (страница для решений – 2):

Утверждение верно, сл.  $x = -5$  – корень уравнения  
 Среднее корней уравнения равно  $-5$ .  
 Ответ:  $-5$ .

$$\begin{aligned} 2) \cos\left(\frac{\pi}{x+2}\right) &= \sin(\pi x) \\ \cos\left(\frac{\pi}{x+2}\right) &= \sqrt{1 - \cos^2(\pi x)} \quad \uparrow^2 \\ \cos^2\left(\frac{\pi}{x+2}\right) &= 1 - \cos^2(\pi x) \\ \cos^2\left(\frac{\pi}{x+2}\right) + \cos^2(\pi x) &= 1 \end{aligned}$$

### Task 3

For each question 1-2, mark one letter.

1. In the text, the word in bold 'launched' is closest in meaning to:

- (A) started
- (B) agreed
- (C) completed
- (D) outlined

2. According to paragraph 7, sustainable development measures taken in Sri Lanka and Philippines resulted in the following EXCEPT:

- (A) people are given better security
- (B) people earn more money than they used to
- (C) trading zones for groceries appeared
- (D) newly produced cars give off less fumes

## АНГЛИЙСКИЙ ЯЗЫК И ОБЩЕСТВОЗНАНИЕ (СОВРЕМЕННЫЙ МЕНЕДЖЕР)

## Task 1

In this integrated task, you should read the text on the topic of environmental issues and answer the essay question. You have about **30 minutes** to read and analyse the text and **40 minutes** to plan, write, and revise your essay. Write your essay in **200–250 words** in an appropriate style. Use your own words as far as possible.

- Identify at least three key environmental challenges that Russia faces today and give your arguments for each of them.
- Using the information from the text, explain if the initiatives presented in the text could be used in Russia to protect and improve the environment.

From Afghanistan to Zimbabwe, 141 countries made significant progress in 2017 to tackle the most urgent environmental challenges facing humanity and our planet, inspiring us to seek out new and more innovative solutions.

The 2030 Agenda for Sustainable Development provides our vision for this work – connecting people and welfare with the planet; development with environment – and signals that our response to these complex and inter-connected challenges must do the same.

In this 10th annual performance report of the United Nations Development Programme (UNDP), we show how investments in the Sustainable Development Goals<sup>1</sup> (SDGs) – on affordable and clean energy, climate action, life below water, and life on land – accelerate the achievement of other goals aimed at ending poverty, achieving zero hunger, achieving gender equality, reducing inequalities, and building strong institutions.

The Asia and the Pacific region is home to more than half of the world's population and faces a range of development challenges. These are often worsened by natural disasters which strain efforts to sustain economic growth and work to improve environmental sustainability.

Since 1992, the Asia and Pacific region has received over 28% of all environmental grant financing mobilized by UNDP for 37 countries in the region. When combined with close to US\$7 billion in co-financing, this total investment of US\$9 billion over the past 25 years has made significant progress in addressing the root causes of environmental degradation, and has built capacity to recover and strengthened livelihoods across the region.

The Kokoda Trail, Papua New Guinea's most famous tourist site, is now protected by the government's Conservation and Environment Protection Agency. Preserving the unique biodiversity along the 100km corridor is vital, as the number of visitors to the country is rising. The trail brings the equivalent of over US\$1 million annually to the country. Tourism Development Area (TDA) management plans developed and **launched** in Samoa identify sensitive tourism locations, provide alternative destinations, and provide recommendations for climate change adaptation action on the ground. More than 75% of tourism operators in targeted TDAs have already invested in and implemented sustainable adaptation measures.

Over 1,300 home gardens using climate-adaptive agriculture and water management practices have been planted in the North Western province of Sri Lanka, supplying an average of 20,000 kg of fruits and vegetables monthly to eight newly established regional farmers markets. The annual income of participating families has increased by 34% and the distance between a farmer and a consumer has been reduced thereby lowering emissions from the transportation of produce. Over 5,400 small-scale farmers in Mindanao in the Philippines are getting compensation for climate risks through weather-indexed based

<sup>1</sup> Sustainable Development Goals – a plan of action to end poverty, protect the planet and guarantee the global well-being of people

insurance, which provides fast payouts to affected farmers after a climate shock; they then have the opportunity to replant and recover more quickly.

Detailed risk maps were developed for 15 mountainous provinces in Vietnam to assist local governments with making informed decisions on risk reduction measures, help in managing climate change impact, prioritizing investments for infrastructure upgrades, including the timing of such investments. In Timor Leste, climate sensitive rural infrastructure activities – including new and restored water supply systems (reservoirs, irrigation systems) – are bringing clean water to rural communities that experience frequent droughts. Farmers and residents have received training on soil bioengineering and management practices concerning rainwater collection.

In Tonga, the Fanga'uta Lagoon Environmental Management Plan was approved by the Cabinet. Efforts to improve long-term sustainability of the lagoon include development of a full monitoring system for the area of land from which water flows into the lagoon to improve water quality and *mangrove* (type of a tropical tree found near water) conservation work. China and the Republic of Korea border the Yellow Sea Large Marine Ecosystem (YSLME) are working together to foster long-term sustainable institutional, policy and financial arrangements for effective management of the area which covers 400,000 km<sup>2</sup>. A special YSLME Commission was set up to coordinate and strengthen legal mechanisms for governing the YSLME which tens of millions of residents rely on.

The East Godavari River Estuarine Ecosystem holds the second largest area of *mangroves* along the east coast of India and is rich in floral and faunal diversity. It generates significant ecological and economic benefits such as shoreline protection, livelihood provision and services to reduce the effect of global warming by protecting forests that absorb large amounts of carbon dioxide. This area is being protected via significant reforms including sustainable fishing and aquaculture regulations integrated into the Andhra Pradesh Marine Fisheries Act and specific protections for marine and coastal biodiversity in the Wildlife Act. These protect water and land ecosystems including manmade landscapes and native biodiversity from risks associated with non-native species.

## Essay:

Nowadays environmental issues are becoming more and more important topics of discussions. I came up with 3 up-to-date environmental problems in Russia that I would like to explain and give possible solutions to.

To begin with, we all know that with the development of transport system the use of petrolum has risen dramatically. These causes a huge amount of chemical instances that are thrown every day in the air every day. Such actions are the reason for air pollution, which I consider to be one of the environmental problems in Russia.

Moreover, after industrialisation in 1960<sup>th</sup> a lot of factories have been built, and a majority of them are on the rivers. As a consequence we can see that factories that do not have filters pollute waters of rivers. This leads to a second problem that I would like to mention – water pollution.

Last but not the least, this problems gets bigger and bigger every year as laws that control hunting in Russia do not

prevent illegal killing of animals. That is why the third problem I consider to be animal extinction. The population of extinct animals is in danger.

According to the text water pollution can be solved by "monitoring system of the area". From my point of view, such measures would not be effective in Russia as ~~they~~ the Chinese monitoring system would not be able to handle such low temperatures in ~~the~~ rivers as in Russia. Moreover, knowing the amount of rivers that we have, we can easily suggest that such systems would cost millions of dollars. One more possible solution given in the text was providing alternative destinations and providing recommendations for climate adaptation action. Such actions would possibly stop animal extinction. I would hazard a guess, that this solution can be useful in Russia ~~as~~ as if hunters had an alternative where they could hunt, they would not kill animals everywhere. What is more, creating such climate that would give animals an opportunity to survive is also useful.

To sum up, there are a lot of problems in environmental structure in Russia and we should find solutions as fast as possible.

## Task 2

Explain the meaning of the term "gender equality" from the text in about 50-100 words.

In the text term "gender equality" means that both men and women have the same amount of rights and these rights cannot be broken because of the gender. In most countries "gender equality" is reached by writing laws that would prevent gender discrimination and by giving everyone (both men and women) an opportunity to take part in economical, political, cultural and social processes in society.

