

Шифр:

92



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**ПИСЬМЕННАЯ РАБОТА УЧАСТНИКА
ОЛИМПИАДЫ ШКОЛЬНИКОВ СПбГУ
2016–2017**

заключительный этап

Предмет (комплекс предметов) Олимпиады **СОВРЕМЕННЫЙ МЕНЕДЖЕР**

Город, в котором проводится Олимпиада Санкт-Петербург

Дата 25 марта 2017 г.

Вариант 2

Математика (Современный менеджер)

Первые 6 задач оцениваются в 3 балла каждая. Остальные по 4 балла.

Часть 1. В задачах 1 – 4 Вам следует обвести в соответствующей графе правильный ответ. (Если Вы случайно выделили не ту клетку, то обведите нужный ответ и напишите его еще раз на полях.)

Задачи		Ответы			
1.	Укажите наибольшее из чисел $a = \log_{0,5} 5$; $b = \lg_{0,05} 55$; $c = \log_{0,55} 55$; $d = \log_5 0,55$	a	b	c	<input checked="" type="radio"/> d
2.	Вычислите $A = \frac{\sin 2x + \sin x}{\cos 2x - \cos x}$, если $\operatorname{tg} \frac{x}{2} = 3$	$-\frac{3}{2}$	$\frac{2}{3}$	<input checked="" type="radio"/> $-\frac{1}{3}$	-3
3.	Меньший положительный корень уравнения $\cos^4 x - \sin^4 x = \frac{\sqrt{3}+1}{2\sqrt{2}}$ равен	<input checked="" type="radio"/> $\frac{\pi}{24}$	$\frac{\pi}{15}$	$\frac{\pi}{12}$	$\frac{\pi}{10}$
4.	Сколько корней имеет уравнение $x^3 + x + 1 = 2x^2$?	0	<input checked="" type="radio"/> 1	2	3

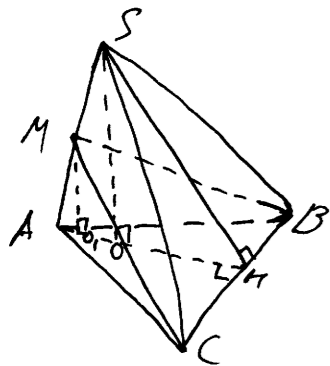
Часть 2. В задачах 5 – 8 следует записать ответ справа от условия задачи (в пустой графе)

5.	Найдите наибольшее целое b , при котором неравенство $\sqrt{x-b} + \frac{x^2}{\sqrt{x-b}} \leq 5$ имеет решение.	1
6.	Вокруг правильного треугольника описана окружность. Наибольший круг, который можно вписать так, чтобы он касался одной из сторон треугольника и этой окружности, но не пересекал бы сторон треугольника, имеет радиус, равный 1. Найдите площадь треугольника.	$12\sqrt{3}$
7.	Решите уравнение $3\sqrt{3x-1} = x^2 + 1$.	$\frac{3-\sqrt{5}}{2}$; $\frac{3+\sqrt{5}}{2}$
8.	Длины диагоналей трапеции отличаются на $\sqrt{3} - 1$, причем они наклонены под углами 30° и 60° к основанию. Найдите площадь трапеции.	$\frac{\sqrt{3}}{2}$

Часть 3. В задачах 9–10 следует справа в соответствующей графе написать ответ, однако дополнительно к этому следует кратко записать решение

9. Через ребро основания правильной треугольной пирамиды проведена плоскость, которая делит объем и полную поверхность пирамиды на две равные части. Найдите двугранный угол при основании пирамиды.	$\arccos \frac{1}{3}$
10. При каком значении x достигается наибольшее значение функции $y = \sqrt{x^3 + 3 - 2x} + \sqrt{5 + 2x - x^3}$?	$-1; \frac{1+\sqrt{5}}{2}; \frac{1-\sqrt{5}}{2}$

Математика, решения заданий 9 и 10:



Дано: $ABCS$ — тр. пирамида; $V_{AMCB} = V_{MSBC}$
 $S_{MAC} + S_{MAB} + S_{ABC} = S_{SMC} + S_{SNB} + S_{SBC}$
 Найти: $\angle(SBC; ABC)$
 Решение:
 1) $V_{AMBC} = \frac{S_{ABC} \cdot MO_1}{3}$
 $V_{AMBC} = \frac{1}{2} \cdot S_{ABC} \cdot SO = \frac{S_{ABC} \cdot SO}{6}$
 $\frac{S_{ABC} \cdot MO_1}{3} = \frac{S_{ABC} \cdot SO}{6}$, т.к. $MO_1 = \frac{SO}{2}$, т.к. MC и BM — медиан, т.к.
 $S_{AMC} = S_{SMC} = S_{SNB} = S_{AMB}$
 2) исходя из рав. площадей:
 $2S_{AMC} + S_{SBC} = 2S_{SMC} + S_{SBC}$; т.к. $S_{ABC} = S_{SBC}$, т.к.
 $ABCS$ — тетраэдр
 $\angle(SBC; ABC) = \angle OKS$
 $\cos \angle OKS = \frac{OK}{SK} = \frac{AC \cdot \frac{\sqrt{3}}{6}}{\frac{AC \cdot \sqrt{3}}{2}} = \frac{2}{6} = \frac{1}{3}$
 $\angle OKS = \arccos \frac{1}{3}$
 Ответ: $\arccos \frac{1}{3}$.

№10.
 $y = \sqrt{x^3 + 3 - 2x} + \sqrt{5 + 2x - x^3}$ и О.Д.З.
 Замена: $x^3 - 2x = t$
 $\begin{cases} x^3 + 3 - 2x \geq 0 \\ 5 + 2x - x^3 \geq 0 \end{cases}$
 $y = \sqrt{t+3} + \sqrt{5-t}$
 $y' = \frac{t'}{2\sqrt{t+3}} - \frac{t'}{2\sqrt{5-t}}$
 1) $t' = 0$
 $3x^2 - 2 = 0$
 $x = \pm \sqrt{\frac{2}{3}}$ соотв. О.Д.З.

2) $\sqrt{t+3} = \sqrt{5-t}$
 $t = 1$
 $x^3 - 2x - 1 = 0$
 $x = -1$
 $x = \frac{1 \pm \sqrt{5}}{2}$ соотв. О.Д.З.
 $f(-1) = f(\frac{1-\sqrt{5}}{2}) = f(\frac{1+\sqrt{5}}{2}) = f_{max}(y)$
 Ответ: $-1; \frac{1+\sqrt{5}}{2}; \frac{1-\sqrt{5}}{2}$.

Обществознание (Современный менеджер)

- Перечислите и кратко охарактеризуйте функции государства: *экономическая (циркуляция благосост. товаров); оборонная (защита суверенитета гос-ва); правоохранительная (обеспечение порядка в гос-ве); культурная (развитие образования и науки);*
- Установите соответствие между отдельными санкциями и типами санкций: к каждой позиции, данной в первом столбце, подберите соответствующую позицию из второго столбца.

САНКЦИИ	ТИПЫ САНКЦИИ
А) премирование	1. формальные санкции
Б) слава	2. неформальные санкции
В) почёт	
Г) увольнение	
Д) штраф	

Запишите в таблицу выбранные цифры под соответствующими буквами

А	Б	В	Г	Д
1	2	2	1	1

- Жители многих городов страны обнаружили, что на протяжении года цены на товары и услуги стабильно увеличиваются, а качество их не изменяется. Данный факт свидетельствует о таком экономическом явлении, как:

- 1) кризис перепроизводства
- 2) инфляция
- 3) дефицит товаров и услуг
- 4) безработица

- Запишите слово, пропущенное в таблице

ФУНКЦИИ РЫНКА	ХАРАКТЕРИСТИКА
Информационная	Рынок предоставляет информацию о ценах, дефицитах и избытке товара
Регулирующая	С помощью рыночного механизма экономика перераспределяет свои ресурсы в пользу того или иного товара
ПОСРЕДНИЧЕСКАЯ	Рынок связывает воедино производителей и потребителей

- Верны ли следующие суждения о государственном бюджете?

А. Государственным бюджетом называют главный финансовый план поступления и расходования денежных средств государства за год.

Б. Государственный бюджет может быть профицитным.

- 1) верно только А
- 2) верно только Б
- 3) верны оба суждения
- 4) оба суждения неверны

- Свободные блага в экономической теории – это блага,

- 1) производство которых гарантируется и обеспечивается государством
- 2) которые для потребления не требуют отказа от других благ и могут потребляться в неограниченном количестве
- 3) доступные в ограниченном количестве и вынуждающие потребителя осуществлять выбор предпочтений
- 4) производимые частными производителями на свой страх и риск

- В стране В только три фармакологических компании, выпускающие лекарственные препараты, пользующиеся спросом у больных. Выберите из приведённого ниже списка характеристики данного рынка и запишите цифры, под которыми они указаны.

- 1) рынок товаров и услуг
- 2) фондовая биржа
- 3) монополия
- 4) национальный рынок
- 5) олигополия
- 6) мировой рынок

- Р. и М. являются прихожанами лютеранской церкви в г. Стокгольме. Они познакомились на службе, создали семью. Если у них в семье происходят какие-то размолвки, неприятности, они первым делом идут за советом к пастору. Они убеждены, что их толкование Святого Писания является единственно верным. Выберите в приведённом ниже функции религии, иллюстрируемые данным примером, и запишите цифры, под которыми они указаны.

- 1) мировоззренческая
- 2) компенсаторная
- 3) коммуникативная
- 4) эстетическая
- 5) хозяйственная

domestic worries). But non-work problems can make it difficult for people to cope with the pressures of work, and their performance at work might suffer. So being understanding to staff in this position would be in your interests.

Are some people more likely to suffer from stress than others?

We're all vulnerable to stress, depending on the pressure we're under at any given time: even people who are usually very hardy. As an employer, you're responsible for making sure that work doesn't make your employees ill. If you notice that someone is particularly vulnerable because of their circumstances, look at how their work is organised. See if there are ways to relieve the pressures so that they do not become excessive. However, unless you know otherwise, you can assume that all your employees are mentally capable of withstanding reasonable pressure from work.

How do I recognise stress in a particular person? Many of the outward signs of stress in individuals should be noticeable to managers and colleagues. Look in particular for changes in a person's mood or behaviour, such as deteriorating relationships with colleagues, irritability, indecisiveness, absenteeism or reduced performance. Those suffering from stress may also smoke or drink alcohol more than usual or even turn to drugs. They might also complain about their health: for example, they may get frequent headaches.

8 According to paragraph 1, the guide states that

- A both stress and pressure produce bad reactions.
- B there is a link between stress and other illnesses.
- C stress can help you to do better.
- D depression is caused by pressure.

9 Why is it important for employers to take stress seriously?

- A The law requires them to make their workplaces stress-free.
- B Reducing stress can be very expensive.
- C Ignoring stress in employees may be expensive for the organisation.
- D Stressed workers complain a lot.

10 According to the law, employers must

- A make sure that all pressures are removed.
- B implement immediate procedures to reduce stress.
- C analyse the causes of illness in the workplace.
- D carry out a study to identify work-related stress.

11 According to paragraph 4, the guide states that

- A employers are not obliged to deal with non-work related health problems.
- B employers must be aware of their employees' home situations.
- C stress at work may influence an employee's home life.
- D employees need to be aware of the causes of stress.

12 In paragraph 5, the guide states that employers

- A must ensure that employees don't fall ill because of their job.
- B should organise their work carefully.
- C can help employees by reorganising their work.
- D mustn't think that every employee can put up with stress.

13 An employer may know when employees are under stress because

- A they will give a warning signal.
- B the outward signs are always visible.
- C consumption of cigarettes may increase.
- D they are always unhappy.



VOCABULARY AND GRAMMAR

A. Complete the adjectives below filling the gaps with missing letters. Each adjective has a clue to help you.

I want to tell you about a boy in my class. Nobody wants to make friends with him and you will see why. He looks down on everyone who hasn't got an indoor swimming pool (1. s l o r b i l l h). He seems to enjoy finding fault with others (2. c r i t i c a l) and can only see one side of things (3. n a r r o w - m i n d e d). Sometimes he is like a donkey (4. s t u b o r n) and you never know what he is going to do (5. u n p r e d i c t a b l e). Oh yes, he will help you - if you make it worth his while (6. m a r i e n e r y). Be careful when he is saying something about you behind your back (7. h i p o c r i t i c a l). He behaves like the weather in April (8. c h a n g e a b l e). He says what you want to hear, not what he thinks (9. i n s a n c e r y) but would believe you if you told him, that pizzas grow on trees (10. g u l l a b l e). He lacks courage (11. c o w a r d l y) and you never know what's on his mind (12. s e c r e t i v e).

Who will ever like such a person!

B. For questions 1-4, think of one word only which can be used appropriately in all three sentences. Write ONLY the missing word.

Here is an example:

- 0 The thief the watch into his pocket when he thought no one was looking.
Several visitors to the castle almost on the newly polished floor.
The speaker a few references to the local football team into his speech, which the audience appreciated greatly.

Answer: slipped

1. I didn't find the of the film totally convincing, did you?
The science teacher asked the class to the results of their experiment on a graph.
The police claim to have uncovered a to break the Parliament.

sense

2. Restaurants often use lighting because it is more flattering.
The government was criticized for taking a line on crime.
The café sells a wide range of drinks.

soft

3. The children safety is my sole
The business took some time to establish itself but it is now a going
There is increasing public about the state of the country's rail service.

interest

4. Let's for lunch now.
Are you going to the news to Marie or shall I?
Gemma will Rob's heart if she decides to leave town.

break

C. For questions 1-4, complete the second sentence so that it has a similar meaning to the first sentence, using the word given. Do not change the word given. You must use between TWO and FIVE words, including the word given.

Example:

(0) Fernanda refused to wear her sister's old dress.

NOT

Fernanda said that SHE WOULD NOT WEAR her sister's old dress.

1. Sally often panics when she's under pressure.

TENDENCY

Sally in tendency panics when she's under pressure.

2. I don't think we need to rewrite this report.

POINT

There's no point in rewriting this report.

3. The house was too expensive for us to rent.

ENOUGH

The house is not cheap enough for us to rent.

4. It wasn't easy for me to find the holiday I wanted.

DIFFICULTY

I was in difficulty to finding the holiday I wanted.

Reading

TEXT I

- You are going to read an article for graduates joining the job market.
- For questions 1-7, choose from the sections of the article (A-C).
- The sections may be chosen more than once.

In which section does the writer

1. advise graduates to continue job-hunting while already working? **C**
2. explain why some graduates accept a certain type of employment opportunity? **C**
3. make a suggestion for graduates whose job hunting has so far been unsuccessful? **B**
4. suggest how graduates can create a good impression? **A**
5. explain why some jobs may have fewer applicants? **B**
6. warn graduates that some information may be difficult to hide? **A**
7. describe an employment opportunity he disapproves of? **C**

Graduate jobs: advice from an expert

You've got a beautiful new degree, a dazzling career ahead of you and the world is your oyster. Terrifying, isn't it?

A You should be very conscious of your digital footprint and remember that nothing can ever really be deleted and this includes social media profiles as well as forums and websites. Although it helps if you activate the privacy settings on your social media accounts and control who you allow to see your account, the most foolproof solution is to behave well and treat these networks with a healthy respect. You might not be able to fully prevent some things from showing on search engines, but you can make the most of what shows up first by using public professional networking sites to build a much more professional footprint which you can then add to by getting mentioned for extra-curricular activity. In the job market this can be gold dust, so find opportunities to comment on blogs and articles, provide quotes for journalists and guest blog on things you're interested in or know a lot about.

B By all means apply for vacancies on big job boards, but the major drawback is that if you've seen a vacancy, so has everybody else. If you've had no joy applying for positions this way, it may well be more productive to start hunting for less visible vacancies instead, because when you do find one, the competition will be a fraction of what you're up against for widely advertised positions. It's important to realise that different job-hunting methods work for different industries. If you're answering ads for junior jobs in media, applying blind is unlikely to reap rewards, but building a network of contacts will. On the other hand, for public-sector jobs all the talking in the world won't get you through the door: you'll have to apply through official channels like everybody else. If you've only targeted big companies, broaden your search to smaller outfits. They'll have tighter recruitment budgets and won't be advertising vacancies or hiring stands at recruitment fairs, so find out how they do recruit and see which small companies are thriving.

C Strictly speaking, in some countries unpaid internships are illegal which means it's illegal for your employer not to pay you and for you to work for free, as you're both undermining the national minimum wage law. The problem is that in some countries this law isn't being enforced, so employers are free to exploit graduates who can afford to work for less than the minimum wage and exclude those who can't. Because many graduates are desperate for experience, the result is that most internships now pay nothing, even when interns are effectively doing a proper job and working long hours with a wide range of activities for months at a time. Until things change, you'll have to decide for yourself whether an unpaid internship is a good investment. This will depend on the calibre of the company and what you'll be doing while you're there. As there is no guarantee of a paid job at the end of it, you must keep applying for roles elsewhere before your internship ends.

TEXT II

Read the following guidelines to employers about stress in the workplace. For each question (8-13), choose one letter (A, B, C or D).

Stress in the workplace

What is stress?

Stress is the adverse reaction people have to excessive pressure. It isn't a disease. But if stress is intense and goes on for some time, it can lead to mental and physical ill health (e.g. depression, nervous breakdown, heart disease). Being under pressure can often improve performance, but when demands and pressures become excessive, they lead to stress. And it's clear from the recognised symptoms of stress that it's actually bad for you.

As an employer, is it my concern?

Yes. It's your duty in law to make sure that your employees aren't made ill by their work. And stress can make your employees ill. Also, action to reduce stress can be very cost-effective. The costs of stress to your organisation may show up as high staff turnover, an increase in sickness absence, reduced work performance, poor timekeeping and more customer complaints. Stress in one person can also lead to stress in staff who have to cover for their colleague. Also, employers who don't take stress seriously may leave themselves open to compensation claims from employees who have suffered ill health from work-related stress.

Under health and safety law, what must I do about stress?

Where stress caused or made worse by work could lead to ill health, you must assess the risk. A risk assessment for stress involves:

- looking for pressures at work that could cause high and long-lasting levels of stress
- deciding who might be harmed by these pressures
- deciding whether you are doing enough to prevent that harm.

If necessary, you must then take reasonable steps to deal with those pressures.

Isn't stress also caused by problems outside work?

Are you saying I have to do something about that?

You're not under a legal duty to prevent ill health caused by stress due to problems outside work (e.g. financial or