



2502846216199

Титульный лист

Направление информатика история математика
 обществознание политология русский язык
 социология физика химия
 филология

Класс 8 9 10 11

Фамилия Щ Е Б Л Ы К И Н

Имя С Е Р Г Е Й

Отчество А Л Е К С А Н Д Р О В И Ч

Дата рождения 1 3 0 5 2 0 0 4

Город участия Е К А Т Е Р И Н Б У Р Г

Аудитория 6 3 2

Телефон + 7 9 3 2 1 2 0 9 7 5 0

Дата 0 1 0 3 2 0 2 2

Подпись

Пример
запог чия

А Б В Г Д Е Ж З И Й К Л М Н О П Р С Т У Ф
Х Ц Ч Ш Щ Ъ Ы Ь Э Ю Я 1 2 3 4 5 6 7 8 9 0



Проверочный лист

Заполняется участниками

- Направление**
- | | | |
|-----------------------------------------|--------------------------------------------|---------------------------------------|
| <input type="checkbox"/> информатика | <input type="checkbox"/> история | <input type="checkbox"/> математика |
| <input type="checkbox"/> обществознание | <input type="checkbox"/> политология | <input type="checkbox"/> русский язык |
| <input type="checkbox"/> социология | <input checked="" type="checkbox"/> физика | <input type="checkbox"/> химия |
| <input type="checkbox"/> филология | | |
- Класс**
- | | | | |
|----------------------------|----------------------------|-----------------------------|----------------------------------------|
| <input type="checkbox"/> 8 | <input type="checkbox"/> 9 | <input type="checkbox"/> 10 | <input checked="" type="checkbox"/> 11 |
|----------------------------|----------------------------|-----------------------------|----------------------------------------|

Заполняется организаторами

Количество доп. листов *1*

Время выхода с : до :

Примечание

Протокол проверки

Заполняется жюри

Номер задания	1	2	3	4	5	6	7	8	9	10
Балл члена жюри №1	<i>20</i>	<i>20</i>	<i>20</i>	<i>08</i>	<i>--</i>					
Балл члена жюри №2	<i>20</i>	<i>20</i>	<i>20</i>	<i>08</i>	<i>--</i>					
Номер задания	11	12	13	14	15	16	17	18	19	20
Балл члена жюри №1										
Балл члена жюри №2										

Итоговый балл *068*

Подпись
члена жюри №1

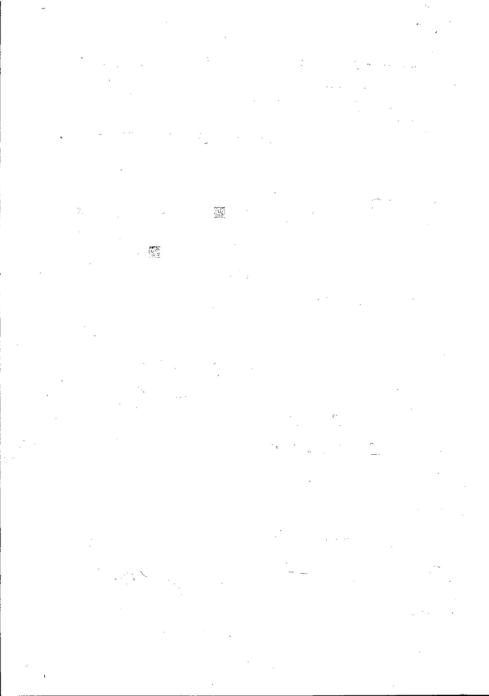


Подпись
члена жюри №2



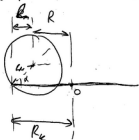
Пример
заполнения

А Б В Г Д Е Ж З И Й К Л М Н О П Р С Т У Ф
Х Ц Ч Ш Щ Ъ Ы Ь Э Ю Я 1 2 3 4 5 6 7 8 9 0



Бланк ответов

11) Баскетбольный мяч может, если равнодействующая сила по вертикали будет направлена вниз \Rightarrow когда имеет такую v , при которой эта равнодействующая будет равна нулю:



R - радиус кривизны траектории мяча $R = R_k + l$

$$R = R_k - l$$

где R_k - радиус мяча; $l = R_k \cdot \cos(\alpha)$

(R_k - радиус мяча) -

$$\Rightarrow R = R_k - R_k \cos(\alpha)$$

Распишем 2-й закон Ньютона на оси O_x и O_y :

$$O_x: mg - N \sin(\alpha) = 0$$

$$O_y: N \cos(\alpha) = m a_y \quad (a_y \text{ - центрострем. ускор. мяча})$$

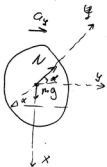
$$a_y = \frac{v_{\min}^2}{R} \Rightarrow N \cos(\alpha) = \frac{m v_{\min}^2}{R} \Rightarrow mg - \frac{\sin(\alpha)}{\cos(\alpha)} \cdot \frac{m v_{\min}^2}{R} = 0$$

$$v_{\min} = \sqrt{\frac{gR}{\tan(\alpha)}} = \sqrt{\frac{g(R_k - R_k \cos(\alpha))}{\tan(\alpha)}} = \sqrt{\frac{10 \text{ м/с}^2 \cdot (0,22 \text{ м} - 0,12 \text{ м} \cdot \cos(45^\circ))}{\tan(45^\circ)}}$$

$$\approx 1,2 \text{ м/с} \quad \text{- Ответ}$$

$$\text{Ответ: } v_{\min} = 1,2 \text{ м/с}$$

(при v_{\min} мяч никогда не упадет, при $v < v_{\min} \Rightarrow$ откатился из кольца наружу)



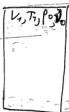
Handwritten notes at the top of the page, including the number '10' and some illegible text.

Handwritten notes in the middle section, featuring a horizontal line and some faint markings.

Handwritten notes in the lower middle section, containing several lines of text and a horizontal line.

Handwritten notes at the bottom of the page, including a large horizontal line and some illegible text.

1) Исх. ситуация:

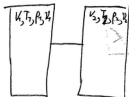


V_0 - кол-во в-ва (газа)
3-я Менделеева-Клапейрона:

$$p_0 V_0 = \nu_0 R T_0 \quad (*)$$

2) После открытия вентиля:

кол-во в-ва не изменится: $V_1 + V_2 = V_0$



2-я Итоговая: ТК-ситуация установлена

ЛДСБ: $p_1 = p_2$

по условию: $T_1 = T_2$

2-я Менделеева-Клапейрона:

$$\begin{cases} p_1 V_1 = \nu_1 R T_1 \\ p_2 V_2 = \nu_2 R T_2 \end{cases} \Leftrightarrow \begin{cases} p V_1 = \nu_1 R T \\ p V_2 = \nu_2 R T \end{cases}$$

где $\nu_2 = \nu_0 - \nu_1$

$$\Rightarrow \begin{cases} p_1 V_1 = \nu_1 R T_1 \\ p_1 V_2 = (\nu_0 - \nu_1) R T_1 \end{cases} \Rightarrow p_1 (V_1 + V_2) = \nu_0 R T_1 = p_0 V_0 \quad (**)$$

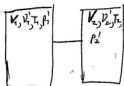
$\Rightarrow p_1 = \frac{V_2}{V_1 + V_2} p_0 = 0,6 p_0$

$\Rightarrow \frac{V_1}{V_1 + V_2} = \frac{2}{5} \Rightarrow 5V_1 = 2V_1 + 3V_2 \Rightarrow 3V_1 = 3V_2 \Rightarrow$

$\Rightarrow V_2 = \frac{2}{3} V_1$

3) Конечное положение:

кол-во в-ва не изменяется $\Rightarrow V_1' + V_2' = V_0 \quad (***)$



Аналогично пункту 2): $p_1' = p_2' = p$

Расширим 3-ю Менделеева-Клапейрона: (т.е. ситуацию учесть установившись, видя процесс медленный)

Расширим 3-ю Менделеева-Клапейрона:

$$\begin{cases} p_1' V_1 = \nu_1' R T_1' \\ p_2' V_2 = \nu_2' R T_2' \end{cases} \Leftrightarrow \begin{cases} p V_1 = \nu_1' R T \\ p V_2 = (\nu_0 - \nu_1') R T \end{cases}$$

$$\Leftrightarrow \begin{cases} p \frac{V_1}{T} = \nu_1' R \\ p \frac{V_2}{T} = (\nu_0 - \nu_1') R \end{cases}$$

$$\frac{p V_1}{T} + \frac{p V_2}{T} = \nu_0 R \stackrel{(**)}{=} \frac{p_0 V_0}{T}$$

12) продолжение!

Также по усл. мы знаем, что $\rho = 0,564 \rho_0 = \frac{111}{250} \rho_0$

$$\text{и что } V_2 = \frac{2}{3} V_1$$

$$\Rightarrow \frac{\rho V_1}{T_1} + \frac{\rho V_2}{T_2} = \frac{\rho_0 V_1}{T_1} \Leftrightarrow \frac{111 \rho_0 V_1}{250 T_1} + \frac{2 \cdot 111 \rho_0 V_1}{250 T_2 \cdot 3} = \frac{\rho_0 V_1}{T_1}$$

$$\frac{111}{250 T_1} + \frac{2 \cdot 111}{250 \cdot 3 \cdot T_2} = \frac{1}{T_1} \quad | \cdot (250 \cdot 3 \cdot T_1 \cdot T_2)$$

$$111 \cdot 3 \cdot T_2 + 2 \cdot 111 T_1 = 250 \cdot 3 \cdot T_2 \Rightarrow T_1 = \frac{250 \cdot 3 T_2 - 111 \cdot 3 T_2}{2 \cdot 111}$$

$$\text{где } T_2 = -23^\circ \text{C} = (273,15 - 23) \text{K} \approx 250 \text{K}$$

$$\Rightarrow T_1 = \frac{250 \cdot 3 \cdot 250 \text{K} - 111 \cdot 3 \cdot 250 \text{K}}{2 \cdot 111} \approx \boxed{289,9 \text{K}}$$

$$\text{Ответ: } T_1 = 289,9 \text{K}$$

Бланк ответов

13) пусть ρ - плотности градинок
 За какое время ток градинок в зависимости от радиуса
 трубы коэф теплоотдачи равен α ; ΔT - разность темп. градинок
 и воздуха. Теплоотдача прямо пропорциональна площади поверхности
 градинок:

$k = S \cdot \alpha$, где $S = \pi R^2 \cdot l$ (точно не помню)
 чему равно l)

$k = \alpha \pi R^2 l = \alpha_0 \pi R^2 l$ (где $l_0 = l \cdot t$)

Тогда $P_{\text{поверхности теплоотдачи}} = \alpha k T = \alpha_0 \Delta T \cdot \pi R^2 = \alpha_0 \pi R^2 \Delta T$

За время dt : $\delta Q = P dt = \alpha_0 R^2 \Delta T dt$

δQ пошло на работу поверхности градинок:



$dm = dV_{\text{пл.}} \cdot \rho = \left(\frac{4}{3} \pi (R+dr)^3 - \frac{4}{3} \pi R^3 \right) \rho$

$= \frac{4}{3} \pi \rho (R^3 + 3R^2 dr + 3R(dr)^2 + (dr)^3 - R^3) = 4\pi \rho R^2 dr$

$\Rightarrow \delta Q = -dm \cdot 2$ (λ - коэф теплопроводн., γ - теплоемкостный коэф)

γ - коэф энергии

$\Rightarrow \delta Q = -4\pi \rho R^2 dr \cdot 2 = -8\pi \rho R^2 dr \Rightarrow \alpha_0 dt = -4\pi \rho \lambda dr$

пусть $\alpha_{\text{вз}} = \frac{\alpha_0}{4\pi \rho \lambda} \Rightarrow \alpha_{\text{вз}} dt = -dr$

$\int_{t_1}^{t_2} dt = - \int_{R_1}^{R_2} dr \Rightarrow \alpha_{\text{вз}} t = R$ где t - время, коэф, γ - теплоемкостный коэф

расстояние градинок радиусом R при $\alpha_{\text{вз}}$

по усл.: $t_1 = 1 \text{ час}$ $\Rightarrow \alpha_{\text{вз}} t_1 = R_1$
 $R_1 = 1 \text{ см}$

Тогда при $R_2 = 10 \text{ см} \Rightarrow \alpha_{\text{вз}} t_2 = R_2$

$t_2 = \frac{R_2}{\alpha_{\text{вз}}} = \frac{R_2}{\left(\frac{R_1}{t_1}\right)} = \frac{R_2}{R_1} t_1 = 10 t_1 = 10 \text{ часов}$
 Ответ: 10 часов

The first part of the paper is devoted to the study of the
 \mathcal{L} -invariant of a Galois representation. We consider a
 Galois representation ρ of a number field K over a
 local field F . The \mathcal{L} -invariant is defined as the
 determinant of the matrix of the \mathcal{L} -invariant of ρ .



The second part of the paper is devoted to the study of the
 \mathcal{L} -invariant of a Galois representation. We consider a
 Galois representation ρ of a number field K over a
 local field F . The \mathcal{L} -invariant is defined as the
 determinant of the matrix of the \mathcal{L} -invariant of ρ .

The third part of the paper is devoted to the study of the
 \mathcal{L} -invariant of a Galois representation. We consider a
 Galois representation ρ of a number field K over a
 local field F . The \mathcal{L} -invariant is defined as the
 determinant of the matrix of the \mathcal{L} -invariant of ρ .

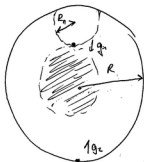
The fourth part of the paper is devoted to the study of the
 \mathcal{L} -invariant of a Galois representation. We consider a
 Galois representation ρ of a number field K over a
 local field F . The \mathcal{L} -invariant is defined as the
 determinant of the matrix of the \mathcal{L} -invariant of ρ .

Бланк Ответов

24

В сферич. полости:

R_1 - радиус полости
 r - планеты (астероида)



Известно, что если какое-то тело находится внутри сферы, то сила тяготения между телом и сферой равна нулю \Rightarrow

пусть g_1 - ускор. свободного падения на вкв. полости

по 3-му Всемирному закону:

$$g_1 = G \frac{M_{\text{сферы}}}{(R - 2R_1)^2}$$

астероида

($M_{\text{сферы}}$ - масса шарообразной части планеты)

$$M_{\text{сферы}} = \frac{4}{3} \pi (R - 2R_1)^3 \rho \quad (\text{т.к. } \rho - \text{плотность астероида-планеты})$$

$$\Rightarrow g_1 = G \frac{\frac{4}{3} \pi (R - 2R_1)^3 \rho}{(R - 2R_1)^2} = \boxed{G \frac{4\pi (R - 2R_1) \rho}{3}}$$

Аналогично g_2 - ускор. свободного падения на другой стороне астероида по 2-му Всемирн. тяготения:

$$g_2 = G \frac{M_{\text{астероида}}}{R^2} - G \frac{M_{\text{полости}}}{(R - R_1)^2}$$

где $M_{\text{полости}}$ - масса, которую полость "отнимает" у астероида по ускор. $M_{\text{полости}} \ll M_{\text{астероида}}$

$$\Rightarrow g_2 \approx G \frac{M_{\text{астероида}}}{R^2}$$

$$2g_2 M_{\text{астероида}} < \frac{4}{3} \pi R^3 \rho \Rightarrow g_2 = G \frac{\frac{4}{3} \pi R^3 \rho}{R^2} = \boxed{\frac{4}{3} G \pi R \rho}$$

т.к. колебания ~~проис~~ пропорциональны квадрату из ускорения свободного падения $\Rightarrow (1002)^2 = \frac{g_2}{g_1} = \left(\frac{501}{500}\right)^2$

$$\Rightarrow \frac{4}{3} \pi R \rho = \left(\frac{501}{500}\right)^2 \cdot \frac{4}{3} \pi (R - 2R_1) \rho$$

$$1 = \left(\frac{501}{500}\right)^2 (R - 2R_1) \Rightarrow R - 2R_1 = \left(\frac{500}{501}\right)^2 R \Rightarrow R_1 = \frac{R - \left(\frac{500}{501}\right)^2 R}{2}$$

$$= \frac{\left(1 - \frac{500}{501}\right) \left(1 + \frac{500}{501}\right) R}{2} = \frac{1}{501} \cdot \frac{1001}{501} R = \frac{1001 R}{2 \cdot 501 \cdot 501} \approx \boxed{0,5 \text{ км}}$$

Ответ:
 $R_1 = 0,5 \text{ км}$

The first part of the document discusses the general principles of the system, and the second part contains the detailed regulations. The regulations are divided into several sections, each dealing with a different aspect of the system. The first section deals with the general principles, the second with the regulations for the different classes of students, and the third with the regulations for the different classes of teachers. The fourth section deals with the regulations for the different classes of officers, and the fifth with the regulations for the different classes of clerks. The sixth section deals with the regulations for the different classes of laborers, and the seventh with the regulations for the different classes of apprentices. The eighth section deals with the regulations for the different classes of soldiers, and the ninth with the regulations for the different classes of sailors. The tenth section deals with the regulations for the different classes of convicts, and the eleventh with the regulations for the different classes of prisoners. The twelfth section deals with the regulations for the different classes of paupers, and the thirteenth with the regulations for the different classes of vagabonds. The fourteenth section deals with the regulations for the different classes of beggars, and the fifteenth with the regulations for the different classes of thieves. The sixteenth section deals with the regulations for the different classes of murderers, and the seventeenth with the regulations for the different classes of assassins. The eighteenth section deals with the regulations for the different classes of robbers, and the nineteenth with the regulations for the different classes of highwaymen. The twentieth section deals with the regulations for the different classes of pirates, and the twenty-first with the regulations for the different classes of privateers. The twenty-second section deals with the regulations for the different classes of counterfeiters, and the twenty-third with the regulations for the different classes of forgers. The twenty-fourth section deals with the regulations for the different classes of swindlers, and the twenty-fifth with the regulations for the different classes of gamblers. The twenty-sixth section deals with the regulations for the different classes of drunkards, and the twenty-seventh with the regulations for the different classes of opium smokers. The twenty-eighth section deals with the regulations for the different classes of prostitutes, and the twenty-ninth with the regulations for the different classes of pimps. The thirtieth section deals with the regulations for the different classes of vagabonds, and the thirty-first with the regulations for the different classes of beggars. The thirty-second section deals with the regulations for the different classes of thieves, and the thirty-third with the regulations for the different classes of murderers. The thirty-fourth section deals with the regulations for the different classes of assassins, and the thirty-fifth with the regulations for the different classes of robbers. The thirty-sixth section deals with the regulations for the different classes of highwaymen, and the thirty-seventh with the regulations for the different classes of pirates. The thirty-eighth section deals with the regulations for the different classes of privateers, and the thirty-ninth with the regulations for the different classes of counterfeiters. The fortieth section deals with the regulations for the different classes of forgers, and the forty-first with the regulations for the different classes of swindlers. The forty-second section deals with the regulations for the different classes of gamblers, and the forty-third with the regulations for the different classes of drunkards. The forty-fourth section deals with the regulations for the different classes of opium smokers, and the forty-fifth with the regulations for the different classes of prostitutes. The forty-sixth section deals with the regulations for the different classes of pimps, and the forty-seventh with the regulations for the different classes of vagabonds. The forty-eighth section deals with the regulations for the different classes of beggars, and the forty-ninth with the regulations for the different classes of thieves. The fiftieth section deals with the regulations for the different classes of murderers, and the fifty-first with the regulations for the different classes of assassins. The fifty-second section deals with the regulations for the different classes of robbers, and the fifty-third with the regulations for the different classes of highwaymen. The fifty-fourth section deals with the regulations for the different classes of pirates, and the fifty-fifth with the regulations for the different classes of privateers. The fifty-sixth section deals with the regulations for the different classes of counterfeiters, and the fifty-seventh with the regulations for the different classes of forgers. The fifty-eighth section deals with the regulations for the different classes of swindlers, and the fifty-ninth with the regulations for the different classes of gamblers. The sixtieth section deals with the regulations for the different classes of drunkards, and the sixty-first with the regulations for the different classes of opium smokers. The sixty-second section deals with the regulations for the different classes of prostitutes, and the sixty-third with the regulations for the different classes of pimps. The sixty-fourth section deals with the regulations for the different classes of vagabonds, and the sixty-fifth with the regulations for the different classes of beggars. The sixty-sixth section deals with the regulations for the different classes of thieves, and the sixty-seventh with the regulations for the different classes of murderers. The sixty-eighth section deals with the regulations for the different classes of assassins, and the sixty-ninth with the regulations for the different classes of robbers. The seventieth section deals with the regulations for the different classes of highwaymen, and the seventy-first with the regulations for the different classes of pirates. The seventy-second section deals with the regulations for the different classes of privateers, and the seventy-third with the regulations for the different classes of counterfeiters. The seventy-fourth section deals with the regulations for the different classes of forgers, and the seventy-fifth with the regulations for the different classes of swindlers. The seventy-sixth section deals with the regulations for the different classes of gamblers, and the seventy-seventh with the regulations for the different classes of drunkards. The seventy-eighth section deals with the regulations for the different classes of opium smokers, and the seventy-ninth with the regulations for the different classes of prostitutes. The eightieth section deals with the regulations for the different classes of pimps, and the eighty-first with the regulations for the different classes of vagabonds. The eighty-second section deals with the regulations for the different classes of beggars, and the eighty-third with the regulations for the different classes of thieves. The eighty-fourth section deals with the regulations for the different classes of murderers, and the eighty-fifth with the regulations for the different classes of assassins. The eighty-sixth section deals with the regulations for the different classes of robbers, and the eighty-seventh with the regulations for the different classes of highwaymen. The eighty-eighth section deals with the regulations for the different classes of pirates, and the eighty-ninth with the regulations for the different classes of privateers. The ninetieth section deals with the regulations for the different classes of counterfeiters, and the hundredth with the regulations for the different classes of forgers.