# Подготовка к ОГЭ по математике

# Задачи из открытого банка

# заданий ОГЭ ФИПИ по математике

# <http://opengia.ru>

# Задание 21

# «Алгебраические выражения. Уравнения и неравенства»

#

#

1. Сократите дробь:

|  |  |
| --- | --- |
| 1. $\frac{x^{3}+5x^{2}-9x-45}{(x-3)(x+5)};$
 | 1. $\frac{x^{3}-4x^{2}-9x+36}{(x-4)(x+3)};$
 |
| 1. $\frac{x^{3}-3x^{2}-4x+12}{(x-3)(x+2)};$
 | 1. $\frac{x^{3}+2x^{2}-16x-32}{(x+2)(x+4)}$.
 |

1. Сократите дробь:

|  |  |
| --- | --- |
| 1. $\frac{ab-3b-2a+6}{a^{2}-9};$
 | 1. $\frac{a^{2}-9}{ab+3b-2a-6};$
 |
| 1. $\frac{ab+4b-20-5a}{a^{2}-16}$ ;
 | 1. $\frac{ab+4b-2a-8}{a^{2}-16}.$
 |

1. Сократите дробь:

|  |  |
| --- | --- |
| 1. $\frac{18^{n}}{3^{2n-1}∙2^{n-2}};$
 | 1. $\frac{12^{n}}{2^{2n-3}∙3^{n-1}};$
 |
| 1. $\frac{20^{n}}{2^{2n-2}∙5^{n-2}};$
 | 1. $\frac{50^{n}}{5^{2n-1}∙2^{n-1}};$
 |
| 1. $\frac{45^{n}}{3^{2n-1}∙5^{n-2}};$
 | 1. $\frac{75^{n}}{5^{2n-1}∙3^{n-2}};$
 |
| 1. $\frac{36^{n}}{3^{2n-1}∙4^{n-2}};$
 | 1. $\frac{48^{n}}{4^{2n-1}∙3^{n-3}};$
 |
| 1. $\frac{80^{n}}{4^{2n-1}∙5^{n-2}};$
 | 1. $\frac{100^{n}}{5^{2n-1}∙4^{n-2}}$.
 |

1. Сократите дробь:

|  |  |
| --- | --- |
| 1. $\frac{\left(2x\right)^{2}∙x^{-9}}{x^{-15}∙5x^{8}}$ ;
 | 1. $\frac{\left(4x\right)^{3}∙x^{-5}}{x^{-7}∙5x^{5}}$;
 |
| 1. $\frac{\left(4x\right)^{2}∙x^{-7}}{x^{-8}∙2x^{3}};$
 | 1. $\frac{\left(6x\right)^{2}∙x^{-4}}{x^{-10}∙4x^{8}}$.
 |

1. Упростите выражение:
2. $\frac{9}{x-3}-\frac{3x}{\left(x-3\right)^{2}}:\frac{3x}{x^{2}-9}-\frac{2x-3}{x-3};$
3. $\frac{3c}{c+2}-\frac{c}{\left(c+2\right)^{2}}:\frac{c}{c^{2}-4}-\frac{4c+6}{c+2};$
4. $\frac{3}{b-1}+\frac{b}{\left(b-1\right)^{2}}:\frac{b}{b^{2}-1}-\frac{3b+2}{b-1};$
5. $\frac{1}{a+1}-\frac{a}{a^{2}-1}:\frac{a}{ \left(a-1\right)^{2}}-\frac{3a+6}{a+1}.$
6. Найдите значение выражения:
7. 61*a*−11*b*+50, если $\frac{2a-7b+5}{7a-2b+5}=9;$
8. 39*a*−15*b*+25, если $\frac{3a-6b+4}{6a-3b+4}=7$;
9. 31*a*−4*b*+55, если $\frac{a-4b+7}{4a-b+7}=8$;
10. 41*a*−11*b*+15, если $\frac{4a-9b+3}{9a-4b+3}=5$.
11. Решите уравнение:

|  |  |
| --- | --- |
| 1. *x*3+4*x*2=9*x*+36;
 | 1. *x*3+7*x*2=4*x*+28;
 |
| 1. *x*3+5*x*2=9*x*+45;
 | 1. *x*3+6*x*2=4*x*+24.
 |

1. Решите уравнение:

|  |  |
| --- | --- |
| 1. *x*3=*x*2+6*x*;
 | 1. *x3*=2*x2*+3*x*;
 |
| 1. *x3*=3*x2*+4*x*;
 | 1. *x3*=2*x2*+15*x*.
 |

1. Решите уравнение:

|  |  |
| --- | --- |
| 1. *x*3+5*x*2−*x*−5=0;
 | 1. *x*3+2*x*2−*x*−2=0;
 |
| 1. *x*3+5*x*2−9*x*−45=0;
 | 1. *x*3+4*x*2−*x*−4=0.
 |

1. Решите уравнение :
2. (*x*−2)2(*x*−3)=12(*x*−2);
3. (*x*−2)2(*x*−3)=20(*x*−2);
4. (*x*−3)2(*x*−5)=35(*x*−3);
5. (*x*−2)2(*x*−4)=24(*x*−2).
6. Решите уравнение :
7. *x*(*x*2+2*x*+1)=2(*x*+1);
8. (*x*−1)(*x*2+4*x*+4)=4(*x*+2).
9. *x*(*x*2+6*x*+9)=4(*x*+3).
10. (*x*−1)(*x*2+8*x*+16)=6(*x*+4)
11. Решите уравнение

|  |  |
| --- | --- |
| 1. (*x*+5)3=25(*x*+5);
 | 1. (*x*+3)3=9(*x*+3);
 |
| 1. (*x*+2)3=16(*x*+2);
 | 1. (*x*+2)3=4(*x*+2).
 |

1. Решите уравнение
2. (4*x*−8)2(*x*−8)=(4*x*−8)(*x*−8)2;
3. (2*x*−4)2(*x*−4)=(2*x*−4)(*x*−4)2;
4. (2*x*−5)2(*x*−5)=(2*x*−5)(*x*−5)2;
5. (2*x*−6)2(*x*−6)=(2*x*−6)(*x*−6)2.
6. Решите уравнение
7. (*x*−3)(*x*−4)(*x*−5)=(*x*−2)(*x*−4)(*x*−5);
8. (*x*−2)(*x*−4)(*x*−6)=(*x*−4)(*x*−5)(*x*−6);
9. (*x*−4)(*x*−5)(*x*−6)=(*x*−2)(*x*−5)(*x*−6);
10. (*x*−2)(*x*−3)(*x*−5)=(*x*−2)(*x*−4)(*x*−5).
11. Решите уравнение:
12. *x*2−2*x*+$\sqrt{3-x}$ =$ \sqrt{3-x}$+8;
13. *x*2−3*x*+$\sqrt{6-x}$ =$ \sqrt{6-x}$+28;
14. *x*2−3*x*+$\sqrt{6-x}$ =$ \sqrt{6-x}$+40;
15. *x*2−3*x*+$\sqrt{3-x}$ =$ \sqrt{3-x}$+10.
16. Найдите корень уравнения:

|  |  |
| --- | --- |
| 1. (*x*+3)2=(*x*+8)2;
 | 1. (*x*−5)2=(*x*+10)2;
 |
| 1. (*x*+9)2​=(*x*+6)2;
 | 1. (*x*+10)2=(*x*−9)2.
 |

1. Решите уравнение:
2. (*x*2−36)2+(*x*2+4*x*−12)2=0;
3. (*x*2−9)2+(*x*2−2*x*−15)2=0;
4. (*x*2−49)2+(*x*2+4*x*−21)2=0;
5. (*x*2−4)2+(*x2*−3*x*−10)2=0.
6. Решите уравнение:
7. (*x*+2)4−4(*x*+2)2−5=0;
8. (*x*+1)4+(*x*+1)2−6=0;
9. (*x*+3)4+2*(x*+3)2−8=0;
10. (*x*−1)4−2(*x*−1)2−3=0.
11. Решите уравнение:

|  |  |
| --- | --- |
| 1. *x4*=(2*x*−15)2;
 | 1. *x4*=(3*x*−10)2;
 |
| 1. *x4*=(4*x*−5)2;
 | 1. *x4*=(*x*−12)2.
 |

1. Решите неравенство:

|  |  |
| --- | --- |
| 1. (*x*−1)2<$\sqrt{2}$(*x*−1);
 | 1. (*x*−2)2<$\sqrt{3}$(*x*−2);
 |
| 1. (*x*−3)2<$\sqrt{5}$(*x*−3);
 | 1. (*x*−4)2<$\sqrt{6}$(*x*−4).
 |

1. Решите неравенство:

|  |  |
| --- | --- |
| 1. $\frac{- 12}{(x-1)^{2}-2}\geq 0$
 | 1. $\frac{- 11}{(x-2)^{2}-3}\geq 0$
 |
| 1. $\frac{- 10}{(x-3)^{2}-5}\geq 0$
 | 1. $\frac{- 13}{(x-4)^{2}-6}\geq 0$
 |

1. Решите систему уравнений:

|  |  |
| --- | --- |
| 1. $\left\{\begin{array}{c}2x-y=-8,\\\frac{x-1}{3}+\frac{y}{2}=-1;\end{array}\right.$
 | 1. $\left\{\begin{array}{c}x-2y=-8,\\\frac{x}{4}+\frac{y-2}{3}=-1;\end{array}\right.$
 |
| 1. $\left\{\begin{array}{c}x+2y=5,\\\frac{x}{4}+\frac{y+6}{3}=3;\end{array}\right.$
 | 1. $\left\{\begin{array}{c}2x-y=-8,\\\frac{x-1}{2}+\frac{y}{3}=1.\end{array}\right.$
 |

1. Решите систему уравнений:

|  |  |
| --- | --- |
| 1. $\left\{\begin{array}{c}3x^{2}-2x=y,\\3x-2=y;\end{array}\right.$
 | 1. $\left\{\begin{array}{c}3x^{2}-4x=y,\\3x-4=y;\end{array}\right.$
 |
| 1. $\left\{\begin{array}{c}2x^{2}-5x=y,\\2x-5=y;\end{array}\right.$
 | 1. $\left\{\begin{array}{c}2x^{2}-x=y,\\2x-1=y;\end{array}\right.$
 |

1. Решите систему уравнений

|  |  |
| --- | --- |
| 1. $\left\{\begin{array}{c}3x^{2}+y=4,\\2x^{2}-y=1;\end{array}\right.$
 | 1. $\left\{\begin{array}{c}2x^{2}+y=4,\\4x^{2}-y=2;\end{array}\right.$
 |
| 1. $\left\{\begin{array}{c}3x^{2}+y=6,\\4x^{2}-y=1;\end{array}\right.$
 | 1. $\left\{\begin{array}{c}x^{2}+y=5,\\6x^{2}-y=2.\end{array}\right.$
 |

1. Решите систему уравнений:

|  |  |
| --- | --- |
| 1. $\left\{\begin{array}{c}2x^{2}+3y^{2}=11,\\4x^{2}+6y^{2}=11x;\end{array}\right.$
 | 1. $\left\{\begin{array}{c}2x^{2}+4y^{2}=24,\\4x^{2}+8y^{2}=24x;\end{array}\right.$
 |
| 1. $\left\{\begin{array}{c}x^{2}+3y^{2}=31,\\2x^{2}+6y^{2}=31x;\end{array}\right.$
 | 1. $\left\{\begin{array}{c}5x^{2}+y^{2}=36,\\10x^{2}+2y^{2}=36x.\end{array}\right.$
 |

# Ответы.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| № п/п |  |  |  |  |
|  | $$x+3$$ | $$x-3$$ | $$x-2$$ | $$x-4$$ |
|  | $$\frac{b-2}{a+3}$$ | $$\frac{a-3}{b-2}$$ | $$\frac{b-5}{a-4}$$ | $$\frac{b-2}{a-4}$$ |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| № п/п |  |  |  |  |  |  |  |  |  |  |
|  | 12 | 24 | 100 | 10 | 75 | 45 | 48 | 108 | 100 | 80 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| №п/п |  |  |  |  |
|  | $$\frac{4}{5}$$ | $$\frac{64}{5}$$ | 8 | 9 |
|  | - 3 | - 2 | - 2 | - 4 |
|  | 10 | 1 | 6 | 3 |
|  | - 4; - 3; 3 | - 7; -2; 2 | - 5; - 3; 3 | - 6; -2; 2 |
|  | - 2; 0; 3 | - 1; 0; 3 | - 1; 0; 4 | - 3; 0; 5 |
|  | -5; -1; 1 | -2; -1; 1 | -5; -3; 3 | -4; -1; 1 |
|  | -1; 2; 6 | -2; 2; 7 | -2; 3; 10 | -2; 2; 8 |
|  | -2; -1; 1 | -3; -2; 2 | -4; -3; 1 | -5; -4; 2 |
|  | -10; -5; 0 | -6; -3; 0 | -6; -2; 2 | -4; -2; 0 |
|  | 0; 2; 8 | 0; 2; 4 | 0; 2,5; 5 | 0; 3; 6 |
|  | 4; 5 | 4; 6 | 5; 6 | 2; 5 |
|  | -2 | -4 | -5 | -2 |
|  | -5,5 | -2,5 | -7,5 | -0,5 |
|  | -6 | -3 | -7 | -2 |
|  | $$-2-\sqrt{5};-2+\sqrt{5}$$ | $$-1-\sqrt{2};-1+\sqrt{2}$$ | $$-3-\sqrt{2};-3+\sqrt{2}$$ | $$-1-\sqrt{3};-1+\sqrt{3}$$ |
|  | -5; 3 | -5; 2 | -5; 1 | -4; 3 |
|  | $$\left(1;1+\sqrt{2}\right)$$ | $$\left(2;2+\sqrt{3}\right)$$ | $$\left(3;3+\sqrt{5}\right)$$ | $$\left(4;4+\sqrt{6}\right)$$ |
|  | $$\left(1-\sqrt{2};1+\sqrt{2}\right)$$ | $$\left(2-\sqrt{3};2+\sqrt{3}\right)$$ | $$\left(3-\sqrt{5};3+\sqrt{5}\right)$$ | $$\left(4-\sqrt{6};4+\sqrt{6}\right)$$ |
|  | $$\left(-3,5;1\right)$$ | $$\left(-4;2\right)$$ | $$\left(2;1,5\right)$$ | $$\left(-1;6\right)$$ |
|  | $$\left(\frac{2}{3};0\right);\left(1;1\right)$$ | $$\left(\frac{4}{3};0\right);\left(1;-1\right)$$ | $$\left(2,5;0\right);\left(1;-3\right)$$ | $$\left(0,5;0\right);\left(1;1\right)$$ |
|  | $$\left(1;1\right);\left(-1;1\right)$$ | $$\left(1;2\right)\left(-1;2\right)$$ | $$\left(1;3\right)\left(-1;3\right)$$ | $$\left(1;4\right)\left(-1;4\right)$$ |
|  | $$\left(2;1\right);\left(2;-1\right)$$ | $$\left(2;2\right);\left(2;-2\right)$$ | $$\left(2;3\right);\left(2;-3\right)$$ | $$\left(2;4\right);\left(2;-4\right)$$ |