Шахмейстер. Дроби.

1. Упростите выражения:

а) $\left(\dfrac{2x}{1-3y}+\dfrac{2x}{3y+1}\right):\dfrac{4x^2+14x}{9y^2+1-6y}$

б) $\left(\dfrac{1+n}{n^2-mn}-\dfrac{1-m}{m^2-mn}\right):\dfrac{m+n}{m^2n-n^2m}$

в) $\dfrac{x^3-9xy^2}{9y^2+x^2}\cdot\left(\dfrac{x+3y}{x^2-3xy}+\dfrac{x-3y}{3xy+x^2}\right)$

г) $\dfrac{(3a-2b)^2}{b-3a}+\dfrac{9a^2}{3a-b}$

д) $\dfrac{k^2-p^2}{k^2-p^2+12kn+36n^2}+\dfrac{12n(3n+p)}{p^2-k^2-12kn-36n^2}$

е) $\dfrac{12bc^2+b^3}{(b-2c)^2}-\dfrac{6b^2c+5c^3}{(2c-b)^2}+\dfrac{3c^3}{4bc-4c^2-b^2}$

ж) $(1-b)^2\left(\dfrac{1}{(1-b)^2}-\dfrac{1}{1-b^2}\right)+\dfrac{3+b}{1+b}$

з) $\left(\dfrac{5x}{x-9}+\dfrac{42x}{x^2-18x+81}\right):\dfrac{5x-3}{x^2-81}-\dfrac{9(x+9)}{x-9}$

и) $\dfrac{(5x-1)^3}{5x-2}+\dfrac{-1+5x}{2-5x}$

к) $\dfrac{(2y+3x)^2}{2y-3z}-\dfrac{(2y-3z)^2}{2y+3z}$

2. Упростите выражения:

а) $\dfrac{y^3-9x^2y+x}{xy^2-9x^3}+(1-3x-y)\cdot\left(\dfrac{3x+y+1}{9x^2-y^2}-\dfrac{3x+y}{9x^2-3x+y-y^2}\right)$

б) $\left(\dfrac{ab+b^2}{5a^2-5ab}+ab+b^2\right)\cdot\dfrac{5a}{a+b}-\dfrac{b}{a-b}$

в) $\dfrac{x^4-2x^3+3x^2}{x^4-x^2+4x-4}-\dfrac{x^2}{x^2+x-2}+\dfrac{x^2}{x^2-x+2}-1$

г) $\left(\dfrac{x^2+4}{4x^2+2x}-\dfrac{2x}{2x^3+x^2+8x+4}\right)\cdot\dfrac{4x^2+2x}{x^6-64}-\dfrac{x^2-3}{x^4-16}$

д) $\dfrac{\frac{a-b}{1+ab}-\frac{a-c}{1+ac}}{1+\frac{(a-b)(a-c)}{(1+ab)(1+ac)}}$

е) $\left(\dfrac{x+3}{x+2}\right)^3-\dfrac{x-4}{x+1}$

ж) $\left(\dfrac{4n+1}{2n^2+n-10}-\dfrac{4}{n^2-4}\right)\cdot\dfrac{4n^2+10n}{4n+9}+\dfrac{4}{n+2}1$

з) $\left(\dfrac{36}{\frac{7a-17b}{11a-19b}-\frac{11a-19b}{7a-17b}}+\dfrac{77a-166b}{2a-b}\right):\dfrac{45b^2}{2a^2-5ab+2b^2}$

и) $\left(\dfrac{2}{a^2-6a}+\dfrac{1}{2(a+8)}+\dfrac{5}{(a-6)(a+4)}\right):\dfrac{4a+a^2}{2a-12}$

к) $\left(\dfrac{1}{x+2}+\dfrac{9}{2x^2-x-10}+\dfrac{8}{2x^2-5x}\right)\cdot\left(\dfrac{52}{x+4}+2x-13\right)$

3. Тренировочная карточка 1

а) $\left(x+\dfrac{3-x^2}{x+1}\right):\dfrac{x+3}{1-x^2}$

б) $\dfrac{1}{a-2}-\dfrac{4a}{a^2-4}\cdot\left(\dfrac{1}{a-1}-\dfrac{1}{a^2-a}\right)$

в) $\left(a+1+\dfrac{1}{a-1}\right):\dfrac{a^2}{a^2-2a+1}$

г) $\dfrac{-5x-6}{x^2-4}+\dfrac{x}{x^2-4}:\dfrac{x}{x-2}+\dfrac{x+2}{x-2}$

д) $\left(\dfrac{10}{25-b^2}+\dfrac{-1}{5+b}+\dfrac{1}{5-b}\right)(25-10b+b^2)$

е) $\left(\dfrac{5m}{m+3}-\dfrac{14m}{m^2+6m+9}\right):\dfrac{5m+1}{m^2-9}+\dfrac{3(m-3)}{m+3}$

ж) $\left(\dfrac{4a}{a^2-1}+\dfrac{a-1}{a+1}\right)\cdot\dfrac{a}{a+1}-\dfrac{a}{a-1}$

з) $\left(\dfrac{1}{2-4b}+\dfrac{b+1}{8b^3-1}\cdot\dfrac{4b^2+2b+1}{1+2b}\right):\dfrac{1}{4b-2}$

и) $\left(\dfrac{2}{(a-2)^2}-\dfrac{a}{4-a^2}\right):\dfrac{4+a^2}{4-a^2}+\dfrac{2}{a-2}$

к) $\dfrac{x+12}{x^3-9x}:\left(\dfrac{x-3}{2x^2+5x-3}-\dfrac{9}{9-x^2}\right)+\dfrac{1}{x^2}$

4. Тренировочная карточка 2

а) $\left(x+\dfrac{3-x^3}{1+x^2}\right)\cdot\dfrac{1+x^2}{x^2+6x+9}$

б) $\left(\dfrac{x+6}{3x+9}-\dfrac{1}{x+3}\right)\cdot\dfrac{3}{x-3}-\dfrac{6}{x^2-9}$

в) $\left(a-5+\dfrac{15}{a+5}\right):\dfrac{a^2-10}{a^2+10a+25}$

г) $\dfrac{3y-2}{y^2-4}+\dfrac{3}{y^2-4}\cdot\dfrac{y+2}{3}+\dfrac{y}{y+2}$

д) $\left(\dfrac{-1}{x-4}+\dfrac{16}{x^2-16}+\dfrac{2}{x+4}\right)(x^2-8x+16)$

е) $\left(\dfrac{5a}{a+1}-\dfrac{3a}{a^2+2a+1}\right):\dfrac{5a+2}{a^2-1}+\dfrac{a-1}{a+1}$

ж) $\left(\dfrac{36x}{x^2-81}+\dfrac{x-9}{x+9}\right)\cdot\dfrac{x}{x+9}-\dfrac{x}{x-9}$

з) $\left(\dfrac{x^3-8}{x-2}+2x\right):(4-x^2)+\dfrac{x-1}{x-2}$

и) $\left(\dfrac{2}{4-x^2}-\dfrac{2}{(x-2)^2}\right):\dfrac{4}{(2-x)^2}-\dfrac{2-x}{x+2}$

к) $\left(\dfrac{2x}{x+3}+\dfrac{1}{x-1}-\dfrac{4}{x^2+2x-3}\right)\cdot\dfrac{x}{2x+1}-\dfrac{3(x+4)}{x+3}$

5. Тренировочная карточка 3

а) $\left(a+\dfrac{6-a^2}{1+a}\right):\dfrac{6+a}{a^2-1}$

б) $\dfrac{3a}{a^2-9}-\dfrac{3}{a^2-9}\left(\dfrac{a+2}{3a-3}-\dfrac{1}{a-1}\right)$

в) $\left(a+6\dfrac{6}{a-6}\right)\cdot\dfrac{a^2-12a+36}{a^2-30}$

г) $\dfrac{3a-4}{a+1}+\dfrac{a}{a+1}:\dfrac{a}{a^2-1}+\dfrac{5-2a}{a+1}$

д) $\left(\dfrac{2}{a-5}-\dfrac{20}{a^2-25}+\dfrac{-1}{a+5}\right)(a^2+10a+25)$

е) $\left(\dfrac{5x}{x-9}+\dfrac{42x}{x^2-18x+81}\right)\cdot\dfrac{x^2-81}{5x-3}-\dfrac{9(x+9)}{x-9}$

ж) $\left(\dfrac{32a}{64-a^2}+\dfrac{8-a}{8+a}\right):\dfrac{8+a}{8}-\dfrac{8}{8-a}$

з) $\left(\dfrac{a^3+1}{a+1}-a\right):(1-a^2)+\dfrac{2a}{a+1}$

и) $\dfrac{3-2m}{m+5}+\dfrac{(5-m)^2}{m}\cdot\left(\dfrac{m}{(m-5)^2}-\dfrac{m}{25-m^2}\right)$

к) $\left(\dfrac{3}{x-3}+\dfrac{4}{x^2-5x+6}+\dfrac{2x}{x-2}\right):\dfrac{2x+1}{3}+\dfrac{3(x-2)}{3-x}$

6. Тренировочная карточка 4

а) $\left(b+\dfrac{3-b^2}{b-2}\right):\dfrac{3-2b}{b^2-4b+4}$

б) $\left(\dfrac{1}{b-1}-\dfrac{1}{b^2-b}\right)\cdot\dfrac{b}{b+2}+\dfrac{4}{b^2-4}$

в) $\left(x+5+\dfrac{50}{x-5}\right):\dfrac{x^2+25}{x^2-10x+25}$

г) $\dfrac{5a-6}{a+2}+\dfrac{a}{a+2}\cdot\dfrac{a^2-4}{a}+\dfrac{10-3a}{a+2}$

д) $\left(\dfrac{4b}{b+8}-\dfrac{9b}{b^2+16b+64}\right)\cdot\dfrac{b^2-64}{4b+23}+\dfrac{8(b-8)}{b+8}$

е) $\left(\dfrac{2}{3-b}-\dfrac{4b}{9-b^2}+\dfrac{-1}{3+b}\right)(9+6b+b^2)$

ж) $\left(\dfrac{28b}{b^2-49}+\dfrac{b-7}{b+7}\right)\cdot\dfrac{b}{b+7}-\dfrac{b}{b-7}$

з) $\dfrac{a^2}{3+a}\cdot\dfrac{9-a^2}{a^2-3a}+\dfrac{27+a^3}{3-a}:\left(3+\dfrac{a^2}{3-a}\right)$

и) $\left(\dfrac{9}{y^2-9}+\dfrac{3}{(3-y)^2}\right):\dfrac{6}{(y-3)^2}+\dfrac{1-2y}{3+y}$

к) $\left(\dfrac{2}{x+1}+\dfrac{10}{x^2-3x-4}+\dfrac{3x}{x-4}\right):\dfrac{3x+2}{3}+\dfrac{x-1}{4-x}$

7. Тренировочная карточка 5

а) $\left(2x-y-\dfrac{2x-y^2}{y}\right)\cdot\dfrac{a}{3xy-3x}-\dfrac{a-1}{y}$

б) $\dfrac{m}{m^2-2m+1}-\dfrac{1}{1-m}\cdot\dfrac{m}{m+1}-\dfrac{2}{m+1}$

в) $\left(\dfrac{1}{1-a}-\dfrac{1}{1+a}-1\right)\cdot(a^2-1)$

г) $\left(\dfrac{a}{b(b+a)}-\dfrac{a-b}{a^2+ab}\right):\left(\dfrac{b^2}{a^3-ab^2}+\dfrac{1}{a+b}\right)$

д) $\left(\dfrac{4y^2+21}{2y+2}-6\right):\dfrac{2xy+4y-3x-6}{2-2y^2}$

е) $\left(\dfrac{x^2-2x+4}{4x^2-1}\cdot\dfrac{2x^2+x}{x^3+8}-\dfrac{x+2}{2x^2-x}\right):\dfrac{4}{x^2+2x}-\dfrac{x+4}{3-6x}$

ж) $\left(\dfrac{x^2+3x+2}{x^2+2x+1}-\dfrac{3x+4}{3x+3}\right)\cdot\dfrac{x^2-1}{3}$

з) $\left(\dfrac{a}{a+b}+\dfrac{b}{a-b}+\dfrac{2ab}{b^2-a^2}\right)\cdot\dfrac{a}{a+b}-\left(\dfrac{b}{b-a}-\dfrac{2ab}{a^2-b^2}\right)\cdot\dfrac{a-b}{a+b}$

и) $ab+\dfrac{ab}{a+b}\cdot\left(\dfrac{a+b}{a-b}-a-b\right)$

к) $\dfrac{x^2-3x+2}{x-1}-\dfrac{3x^2+7x-10}{3x+10}-\dfrac{5-4x-9x^2}{x+1}$

8. Тренировочная карточка 6

а) $\left(3a-1-\dfrac{3a-1}{x}\right)\cdot\dfrac{x}{2x-2}-2a$

б) $\left(\dfrac{1+x}{1-2x+x^2}-\dfrac{1}{x+1}\right):\dfrac{x}{x-1}+\dfrac{2}{x+1}$

в) $\left(1-\dfrac{1}{x-1}+\dfrac{1}{x+1}\right):\dfrac{1}{x^2-1}$

г) $\left(\dfrac{y}{2x^2+xy}-\dfrac{x}{2xy+y^2}\right)\cdot\left(\dfrac{x}{x^2-y^2}-\dfrac{x+y}{x^2-xy}\right)$

д) $\left(4-\dfrac{9x^2-8}{3x-3}\right):\dfrac{2a+6x-3ax-9x2}{2x^2-2}$

е) $\left(\dfrac{c+5}{5c-1}+\dfrac{c+5}{c+1}\right):\dfrac{c^2+5c}{1-5c}+\dfrac{c^2+5}{c+1}$

ж) $\left(\dfrac{3x^2+8x-7}{3x^2-3}-\dfrac{x+3}{x+1}\right):\dfrac{2}{x^2-2x+1}$

з) $\left(\dfrac{2}{2+m}-\dfrac{m}{m-2}-\dfrac{4}{4-m^2}\right):\left(\dfrac{2}{2+m}+\dfrac{4}{m^2-4}+\dfrac{m}{2-m}\right)$

и) $\dfrac{3}{x+y}-\dfrac{3x-3y}{2x-3y}\cdot\left(\dfrac{2x-3y}{x^2-y^2}-2x+3y\right)$

к) $\dfrac{x^2+7x-8}{x-1}-\dfrac{7x^2+3x-10}{7x+10}-\dfrac{4-5x-9x^2}{x+1}$

9. Тренировочная карточка 7

а) $\dfrac{2}{mn}:\left(\dfrac{1}{m}-\dfrac{1}{n}\right)^2-\dfrac{m^2+n^2}{(m-n)^2}$

б) $\left(\dfrac{5x^2-15xy}{x^2-9y^2}-\dfrac{3xy+9y^2}{x^2+6xy+9y^2}\right):\left(\dfrac{5}{y}-\dfrac{3}{x}\right)$

в) $\left(\dfrac{1}{(2a-b)^2}+\dfrac{2}{4a^2-b^2}+\dfrac{1}{(2a+b)^2}\right)\cdot\dfrac{4a^2+4ab+b^2}{16a}$

г) $\left(x-\dfrac{4xy}{x+y}+y\right)\cdot\left(x+\dfrac{4xy}{x-y}-y\right)$

д) $\left(\dfrac{0,5b-1,5}{0,5b^2-1,5b+4,5}-\dfrac{2b-6}{\frac{1}{3}b^3+9}\right):\dfrac{b-3}{0,8b^3+21,6}$

е) $\dfrac{x-\frac{yz}{y-z}}{y-\frac{xz}{x-z}}$

ж) $\dfrac{\frac{3}{2}a^2-2ab+\frac{2}{3}b^2}{\frac{1}{4}a^2-\frac{1}{9}b^2}+\dfrac{6b}{\frac{3}{4}a+\frac{1}{2}b}$

з) $\dfrac{12c-4c^2}{2c+3}+\dfrac{1}{2c-3}:\left(\dfrac{4}{4c^2-9}-\dfrac{6c-9}{8c^3+27}\right)$

и) $\left(\dfrac{3x^2+5x-14}{3x^2-12}-\dfrac{x+3}{x+2}\right):\dfrac{2}{x^2-4x+4}$

к) $\dfrac{2x^2+x-1}{x+1}+\dfrac{(3x-x^2-2)^2}{x^2-4x+4}$

10. Тренировочная карточка 8

а) $\left(\dfrac{4a^2-6ac}{4a^2-12ac+9c^2}-\dfrac{6ac+9c^2}{4a^2+12ac+9c^2}\right)\cdot\dfrac{6a+9c}{4a^2+9c^2}$

б) $\dfrac{4c^2}{(c-2)^4}:\left(\dfrac{1}{(c+2)^2}+\dfrac{1}{(c-2)^2}+\dfrac{2}{c^2-4}\right)$

в) $\left(a-\dfrac{1-2a^2}{1-a}+1\right):\left(1-\dfrac{1}{1-a}\right)$

г) $\left(\dfrac{a}{0,5a+1}+\dfrac{\frac{2}{3}a}{2-a}+\dfrac{2a}{\frac{1}{4}a^2-1}\right)\cdot\dfrac{0,5a-1}{0,5a-2}$

д) $\left(\dfrac{a-x}{a}+\dfrac{x}{a-x}\right)\left(\dfrac{a+x}{a}-\dfrac{x}{a+x}\right)$

е) $\left(\dfrac{2x^2+3x-5}{x^2-2x+1}-\dfrac{4x+5}{2x-2}\right)\cdot\dfrac{x^2-1}{5}$

ж) $\left(\dfrac{4}{a^2-4a}-\dfrac{3a+32}{a^3-64}\right):\dfrac{a-8}{a^3+4a^2+16a}-\dfrac{4}{4-a}$

з) $\dfrac{y}{x+y}+\left(\dfrac{2x+1}{x+y}-\dfrac{2xy+y}{y^2-x^2}\right):\dfrac{2x+1}{x-y}$

и) $\dfrac{x^2}{(x-y)(x-z)}+\dfrac{y^2}{(y-x)(y-z)}+\dfrac{z^2}{(z-x)(z-y)}$

к) $\dfrac{2x^2-3x+1}{x-1}+\dfrac{(4x-x^2-3)^2}{x^2-6x+9}$

11. Зачётная карточка 1

а) $\left(m^2+\dfrac{6-m^4}{m^2-1}\right)\cdot\dfrac{1+m}{6-m^2}$

б) $\dfrac{2m}{m^2-4}-\dfrac{2}{m^2-4}:\left(\dfrac{m+1}{2m-2}-\dfrac{1}{m-1}\right)$

в) $\left(m-4+\dfrac{32}{m+4}\right)\cdot\dfrac{m^2+8m+16}{m^2+16}$

г) $\dfrac{3-x^2}{x^2-1}+\dfrac{3x}{x^2-1}:\dfrac{x}{x-1}+\dfrac{x-1}{x+1}$

д) $\left(\dfrac{-1}{a-2}+\dfrac{8}{a^2-4}+\dfrac{2}{a+2}\right)(a^2-4a+4)$

е) $\left(\dfrac{2x}{x-7}+\dfrac{7x}{x^2-14x+49}\right):\dfrac{2x-7}{x^2-49}-\dfrac{7(x+7)}{x-7}$

ж) $\left(\dfrac{20x}{25-x^2}+\dfrac{5-x}{5+x}\right):\dfrac{5+x}{5}-\dfrac{5}{5-x}$

з) $\dfrac{8-n^3}{2+n}:\left(2+\dfrac{n^2}{n+2}\right)\dfrac{n^2}{n-2}\cdot\dfrac{4-n^2}{n^2+2n}$

и) $\left(\dfrac{2}{(1-x)^2}+\dfrac{1}{x^2-1}\right)\cdot(x-1)^2-\dfrac{3x}{x+1}$

к) $\left(\dfrac{1}{x+2}+\dfrac{5}{x^2-x-6}+\dfrac{2x}{x-3}\right)\cdot\dfrac{x}{2x+1}-\dfrac{x-9}{2(3-x)}$

12. Зачётная карточка 2

а) $\left(a+\dfrac{2+a^2}{1-a}\right)\cdot\dfrac{1-2a+a^2}{a+2}$

б) $\dfrac{b^2}{b^2-1}+\dfrac{1}{b^2-1}:\left(\dfrac{1}{2b-b^2}-\dfrac{1}{2-b}\right)$

в) $\left(b+3+\dfrac{18}{b-3}\right)\cdot\dfrac{b^2-6b+9}{b^2+9}$

г) $\dfrac{7-5m}{m-4}+\dfrac{4m}{m+4}\cdot\dfrac{m^2-16}{4m}+\dfrac{9m-23}{m-4}$

д) $\left(\dfrac{1}{3+a}-\dfrac{6}{9-a^2}+\dfrac{2}{3-a}\right)\cdot(9-6a+a^2)$

е) $\left(\dfrac{3a}{a+6}-\dfrac{2a}{a^2+12a+36}\right):\dfrac{3a+16}{a^2-36}+\dfrac{6(a-6)}{a+6}$

ж) $\left(\dfrac{16b}{16-b^2}+\dfrac{4-b}{4+b}\right):\dfrac{4+b}{4}-\dfrac{4}{4-b}$

з) $\left(\dfrac{a-1}{a+1}+\dfrac{a^3+1}{a^2-2a+1}\cdot\dfrac{a-1}{a^2-a+1}\right):\dfrac{a^2+1}{a+1}$

и) $\left(\dfrac{4}{4-x^2}-\dfrac{4}{(x-2)^2}\right):\dfrac{2}{(2-x)^2}+\dfrac{4x+1}{x+2}$

к) $\dfrac{a+4}{5(a-1)}:\left(\dfrac{9(a-1)}{3a+4}-\dfrac{(2a-7)^2}{3a^2+a-4}+\dfrac{2}{5(2-a)}\right)$

13. Зачётная карточка 3

а) $\left(x+\dfrac{5-x^2}{1+x}\right):\dfrac{x+5}{x^2+2x++1}$

б) $\left(\dfrac{x+10}{5x+25}-\dfrac{1}{x+5}\right)\cdot\dfrac{5}{x-5}-\dfrac{10}{x^2-25}$

в) $\left(a-1+\dfrac{2}{a+1}\right):\dfrac{a^2+1}{a^2+2a+1}$

г) $\dfrac{-a-24}{a-5}+\dfrac{a}{a+5}:\dfrac{a}{a^2-25}+\dfrac{6a-1}{a-5}$

д) $\left(\dfrac{2}{a-2}-\dfrac{8}{a^2-4}+\dfrac{-1}{a+2}\right)\cdot(a^2+4a+4)$

е) $\left(\dfrac{2m}{m-5}+\dfrac{m}{m^2-10m+25}\right)\cdot\dfrac{m^2-25}{2m-9}-\dfrac{5(m+5)}{m-5}$

ж) $\left(\dfrac{8a}{a^2-4}+\dfrac{a-2}{a+2}\right)\cdot\dfrac{a}{a+2}-\dfrac{a}{a-2}$

з) $\left(\dfrac{m+2}{m+1}-\dfrac{8m^2-8}{m^3-1}:\dfrac{4m+4}{m^2+m+1}\right)\cdot\dfrac{1}{m}$

и) $\dfrac{(1-b)^2}{2b}\cdot\left(\dfrac{1}{(b-1)^2}-\dfrac{1}{1-b^2}\right)-\dfrac{2}{1+b}$

к) $\left(\dfrac{4}{5a^2+a-4}-\dfrac{a+1}{9(5a-4)}\right)\cdot\dfrac{15a-12}{a+7}-\dfrac{2}{a+1}$

14. Зачётная карточка 4

а) $\left(x+\dfrac{3-x^2}{x+1}\right):\dfrac{x+3}{1-x^2}$

б) $\left(\dfrac{x+4}{3x+3}-\dfrac{1}{x+1}\right):\dfrac{x+1}{3}+\dfrac{2}{x^2-1}$

в) $\left(a-2+\dfrac{8}{a+2}\right)\cdot\dfrac{a^2+4a+4}{a^2+4}$

г) $\dfrac{5m-21}{m^2-9}+\dfrac{m}{m^2-9}\cdot\dfrac{m+3}{m}+\dfrac{m-3}{m+3}$

д) $\left(\dfrac{4}{a+1}+\dfrac{2a}{a^2-1}+\dfrac{-1}{a-1}\right)\cdot(a^2+2a+1)$

е) $\left(\dfrac{3a}{a-4}+\dfrac{10a}{a^2-8a+16}\right)\cdot\dfrac{a^2-16}{3a-2}+\dfrac{4(a+4)}{4-a}$

ж) $\left(\dfrac{12b}{9-b^2}+\dfrac{3-b}{3+b}\right):\dfrac{3+b}{3}-\dfrac{3}{3-b}$

з) $\left(\dfrac{1}{2-6a}+\dfrac{1}{27a^3-1}:\dfrac{1+3a}{1+3a+9a^2}\right)\cdot\dfrac{2+6a}{a}$

и) $\dfrac{2}{x-1}+\dfrac{1-x^2}{1+x^2}\cdot\left(\dfrac{1}{(x-1)^2}-\dfrac{x}{1-x^2}\right)$

к) $\left(\dfrac{3a-1}{a^2-4}-\dfrac{9a}{3a^2+5a-2}\right)\cdot\dfrac{15a^3-60a}{12a+1}+\dfrac{5}{1-3a}$

15. Зачётная карточка 5

а) $\dfrac{(2a-b)^2}{a-b}+\dfrac{b^2}{b-a}$

б) $\dfrac{x^3+y^3}{(x-y)^2}+\dfrac{3xy^2+y^3}{2xy-x^2-y^2}$

в) $\dfrac{a^3}{a-3}-\dfrac{3a^3+81}{a^2-9}$

г) $\dfrac{a-1}{2a+2}+\dfrac{a+1}{3-3a}+\dfrac{5a^3-1}{3a^2-3}$

д) $\dfrac{a^2-bc}{a^2-ab+bc-ac}+\dfrac{3b-a}{2b-2a}+\dfrac{a+2c}{3a-3c}$

е) $\dfrac{x-2}{(2x+4)^2}:\left(\dfrac{x}{2x-4}-\dfrac{x^2+4}{2x^2-8}-\dfrac{2}{x^2+2x}\right)$

ж) $1:\left(\dfrac{a}{a-b}+\dfrac{4a^2b-ab^2}{b^3-a^3}+\dfrac{b^2}{a^2+ab+b^2}\right)-\dfrac{-3ab}{(a-b)^2}$

з) $\left(\dfrac{2a-3b}{a-7b}-2+\dfrac{a-7b}{2a-3b}\right)\cdot\left(\dfrac{23a-29b}{a^2+8ab+16b^2}-\dfrac{15a-21b}{a^2+4ab}\right)$

и) $\dfrac{ab+cd}{(a+c)(b-c)}+\dfrac{ac+bd}{(a+b)(c-b)}+\dfrac{ad+bc}{(a+b)(a+c)}$

к) $\dfrac{2}{3-a}+\dfrac{a+3}{a-2}:\left(\dfrac{9(a-2)}{3a+1}-\dfrac{(2a-9)^2}{3a^2-5a-2}\right)$

16. Зачётная карточка 6

а) $\dfrac{(3a-2b)^2}{b-3a}+\dfrac{9a^2}{3a-b}$

б) $\dfrac{12bc^2+b^3}{(b-2c)^2}+\dfrac{3c^3}{4bc-4c^2-b^2}$

в) $\dfrac{4+10x+25x^2}{2+5x}-\dfrac{4-10x+25x^2}{2-5x}$

г) $\dfrac{(2y+3x)^2}{2y-3z}-\dfrac{(2y-3z)^2}{2y+3z}$

д) $\dfrac{1}{c^2-cd}-\dfrac{1}{d^2-cd}-\dfrac{4}{c^2-d^2}$

е) $\dfrac{1}{y-5z}-\dfrac{z}{x^2+2xy}-\dfrac{x+y+5z}{xy-10yz-5xz+2y^2}$

ж) $\left(\dfrac{b^2+9}{27-3b^2}+\dfrac{b}{3b+9}-\dfrac{3}{b^2-3b}\right):\dfrac{(3b+9)^2}{3b^2-b^3}$

з) $\left(\dfrac{2x+5y}{x^2-2xy}-\dfrac{9y}{x^2-4xy+4y^2}\right)\cdot\left(\dfrac{x-5y}{x+y}+2+\dfrac{x+y}{x-5y}\right)$

и) $\left(\left(\dfrac{x^2}{(x+1)^2}-\dfrac{y^2}{(y+1)^2}\right):\left(\dfrac{x}{(x+1)^2}-\dfrac{y}{(y+1)^2}\right)+1\right)\cdot\dfrac{1-xy}{(x+y)(y+1)}$

к) $\left(\dfrac{1}{x+1}+\dfrac{5}{x^2-3x-4}+\dfrac{2x-2}{x-4}\right)\cdot\dfrac{x-1}{2x-1}-\dfrac{x-10}{2(4-x)}$

17. Зачётная карточка 7

а) $\dfrac{(3a-b)^3}{a-b}-\dfrac{b^3-9ab^2}{b-a}$

б) $\dfrac{a^2+5a}{a^2-18a+81}-\dfrac{50-3a}{18a-81-a^2}-\dfrac{131+2a}{(9-a)^2}$

в) $\dfrac{ad-bc}{2cd(c+d)}+\dfrac{ad+bc}{2cd(c-d)}$

г) $\dfrac{(5v+2t)^2}{5v-2t}+\dfrac{(5v-2t)^2}{5v+2t}$

д) $\dfrac{4b}{4b^2-1}+\dfrac{2b+1}{3-6b}+\dfrac{2b-1}{4b+2}$

е) $\dfrac{c+6b}{ac+2bc-6ab-3a^2}+\dfrac{2b}{a^2+2ab}-\dfrac{b}{ac-3a^2}$

ж) $\dfrac{t^2(x-y)(y-z)+y^2(z-t)(x-t)}{z^2(x-y)(x-t)+x^2(y-z)(z-t)}$

з) $\left(\left(\dfrac{4a}{(a-b)^3}-\dfrac{a}{a^3-b^3}\right)\cdot\left(\dfrac{a-b}{a+b}\right)^3-\dfrac{3}{a^2-b^2}\right):\dfrac{3b^2}{a^6-b^6}$

и) $\left(\dfrac{x-2y}{3xy+6y^2}-x^2+2y\right)\cdot\dfrac{x+2y}{x^2-2xy}+\dfrac{6xy^2-1}{3xy}$

к) $\dfrac{a+7}{a+2}:\left(\dfrac{9(a+2)}{3a+13}-\dfrac{(2a-1)^2}{3a^2+19a+26}\right)-\dfrac{2}{a+1}$

18. Зачётная карточка 8

а) $\dfrac{(5x-1)^3}{5x-3}+\dfrac{-1+15x}{3-5x}$

б) $\dfrac{x^3+50}{10x-x^2-25}+\dfrac{2x^2}{(x-5)^2}+\dfrac{25x}{(5-x)^2}$

в) $\dfrac{9m^2-12mn+16n^2}{3m-4n}+\dfrac{9m^2+12mn+16n^2}{3m+4n}$

г) $\dfrac{(4v-q)^2}{4q-v}+\dfrac{(4q-v)^2}{4v-q}$

д) $\dfrac{2a+3c}{4a+2c}-\dfrac{2b-3a}{9a+3b}+\dfrac{6a^2-bc}{6a^2+2ab+3ac+bc}$

е) $\dfrac{(b-c)^2}{(a-b)(c-a)}+\dfrac{(a-c)^2}{(a-b)(b-c)}+\dfrac{(a-b)^2}{(c-a)(b-c)}$

ж) $\left(\dfrac{4z^3}{(z+2)^3}-\dfrac{z^3}{z^3+8}\right):\left(\dfrac{z-2}{z+2}\right)^2-\dfrac{2(z^3-4)}{z^3+8}$

з) $\left(\dfrac{x+4y}{\frac{16x^2}{4y-x}+4y+7x}-\dfrac{1}{1+\frac{8x(x+4y)}{(x-4y)^2}}\right):\dfrac{4y-x}{(3x+4y)^2}$

и) $\dfrac{y+1}{x^2-x+2xy-y+y^2}+\dfrac{x+y}{xy-x+y^2-2y+1}-\dfrac{y^2}{(x+y)(y-1)(x+y-1)}$

к) $\dfrac{1}{(x-1)^2}+\dfrac{x+11}{x^3-3x^2-6x+8}:\left(\dfrac{x-4}{2x^2+x-6}-\dfrac{9}{8+2x-x^2}\right)$